9. CONFIGURATION MANAGEMENT 4

9. Configuration Management

The procedures that have been prepared for this section are applicable to all of ECS including all hardware, software, and firmware components of systems or subsystems, databases and documenation developed or acquired by the ECS contract and/or delegated to configuration management control by the operational site-level organizations. The procedures are applicable to all items maintained by the ECS site and Sustaining Engineering Organization in support of ECS mission-specific projects and multiple mission-specific institutional facilities. The procedures are not applicable to those entities controlled by higher level ESDIS Project Office CM Plans. The procedures also apply to ESDIS authorized replacements of or augmentations to facility assets. CM procedures already in place may be used by the contractor subject to direction from the Change Control Board (CCB) chair person.

The procedures are organized into nine major sections that address the flow-down from the ECS system-level to the site-level with references to site-tailoring of procedures where applicable. The topics include (Section 9.1) configuration identification, (Section 9.2) change control processes, (Section 9.3) configuration status accounting, (Section 9.4) configuration audits, (Section 9.5) data management, and the use of standardized CM tools known as (Sections 9.6 and 9.7) Software CM Manager (ClearCase), (Section 9.8) Change Request Manager (Distributed Defect Tracking System), and (Section 9.9) Baseline Manager (XRP-II).

9.1 Configuration Identification Procedure

9.1.1 Purpose

The purpose of configuration identification during maintenance and operations is to incrementally establish and maintain control and status accounting for the ECS control items. To accomplish configuration identification for hardware, databases, documents and software, the configuration management administrator (CMA) shall ensure the maintenance of each ECS configuration controlled item in an operational baseline by executing the following tasks:

a. Assign identifiers to configuration items (CIs) and their component parts and associated configuration documentation, including revision and version number where appropriate. Assign serial and lot numbers, as necessary, to establish the CI effectivity of each configuration of each item of database, documentation, hardware and software.

b. Follow ECS developer guidelines as referenced below in section 9.1.3.

c. Follow vendor nomenclature for COTS items.

d. Apply operation and maintenance (O&M) version name extensions to ECS modified item nomenclature following the rules in section 9.1.4.

e. Follow author-designated version control and nomenclature for documents and follow guidelines from the ECS Librarian (cf. Section 20, *Library Administration*)

f. Support the ECS Librarian 's efforts to maintain linkage of the ECS documentation to ECS configuration items in the Baseline Manager tool. Ensure that the marking and labeling of items and documentation with their applicable identifiers enables correlation between the item, configuration documentation, and other associated data.

g. Maintain a release system for configuration changes (cf. Section 9.2, *Configuration Change Control Procedures).*

h. Maintain views of operational baselines using the Baseline Manager tool (cf. Section 9.9).

i. Ensure that applicable identifiers are embedded in the source and object code.

9.1.2 Applicable to

All ECS CM Administrators and support personnel.

9.1.3 References

ESDIS CM Plan, June 1996

MO&DSD CM Plan, Sept 1995

ECS M&O CM Plan, Nov 1995

Software Build Process, CM-1-023 (25 March 1996)

Software Naming Conventions, SD-1-015 (14 July 1995)

Directory and File Name Guidelines and Standards for Release A, 15 April 1996

Document Numbering, DM-1-002 (25 November 1994)

DoD Mil-Std-973, April 1992

9.1.4 Procedures

9.1.4.1 Extended Configuration Identification

The extended configuration identification for ECS is of the standard form:

Control Item.Release.Organization.#_Dev.#_M&O.#_center

where:

- *Control Item* is the ECS Project designation of the CI at RRR turnover. The CI naming convention has been explained in CM-1-023 *SW Build Process* and further elaborated in SD-1-015 *SW Naming Conventions*.

- *Release* is the major release, A, B, C, or D.

- *Organization* is the organization that established the configuration. Legal values are DEV for development, SEO, or center (e.g., SMC, EOC, EDC, GSFC, etc.) for center unique.

- *#_Dev* is a numeric identifier applied by the development organization to the major release and/or a minor release.

- *#_M&O* is a numeric identifier applied by the M&O/SEO organization. This field is used by the SEO organization to establish the system M&O baseline.

- *#_Center* is a numeric identifier applied by each center. This field is used by the operational centers to establish the site specific baseline.

For example, at the TRMM Development Release RRR, the ECS CCB establishes the initial operational baseline. Assume this baseline is identified as CI.A.DEV.3. CI.A.DEV.3 is delivered to the ESDIS CCB. After ESDIS CCB acceptance, the M&O organization will configure and build its first, system-wide baseline, CI.A.M&O.3.0. If it is assumed that some M&O tailoring is applied, the baseline released to the operational centers is CI.A.M&O.3.1. Each center then configures a center specific baseline. The RRR baseline for EDC, GSFC, LaRC, and NSIDC as well as the SMC and EOC is built from CI.A.M&O.3.1 and are identified as CI.A.EDC.3.1.1, CI.A.GSFC.3.1.1, CI.A.LaRC.3.1.1, CI.A.NSIDC.3.1.1, CI.A.SMC.3.1.1 and CI.A.EOC.3.1.1.

9.2 Configuration Change Control Procedures

9.2.1 Purpose

The ESDIS chartered Change Control Boards (CCBs) shall apply configuration control measures to all the ECS configuration items and the associated documentation prior to the time it is baselined for operations. The CCBs shall apply configuration control measures to

a. Ensure effective control of all CIs and their approved documentation;

b. Provide effective means, as applicable, for (1) proposing engineering changes to CIs, (2) requesting deviations and waivers pertaining to such items, (3) preparing notices of revision, and (4) preparing Specification Change Notices; and

c. Ensure the implementation of approved changes.

9.2.2 Applicable to

All ESDIS chartered ECS CCBs

9.2.3 References

ESDIS CM Plan, June 1996

MO&DSD CM Plan, Sept 1995

ECS M&O CM Plan, Nov 1995

ECS Development Facility Change Control Process CM-1-007 March 1995

9.2.4 Procedures

9.2.4.1 Configuration Change Request Preparation

The Configuration Change Request (CCR) form in figure 9.2.4-1 has been developed as a medium for the drafting of CCRs throughout the ECS Maintenance and Operations environment for changes processed by the ESDIS Change Control Board (CCB) and its ECS site-level chartered CCBs at the SMC, EOC, and DAACs (GSFC, LaRC, ASF, EDC, JPL, NSIDC, and ORNL). There are numbered items on the form that correspond exactly to the data entry required to be performed by the respective Configuration Management Administrator who maintains CCR records for the CCB on the distributed implementation of the Change Request Manager tool. Each CCB will have unique CCR identification sequence numbers. Each CCB can forward CCRs and reports from the Change Request Manager to SMC where SEO processes system-level CCRs for ESDIS CCB. The ESDIS CM Plan will determine the charter of the respective CCBs and thus the scope of CCR issues to be addressed by the site CCBs.

Earth Observing System Data and Information System (EOSDIS)
Core System (ECS)
Configuration Change Request (CCR)

1. **Configuration Control Board (CCB)** ESDIS:___ ECS:___ SMC:___ DAAC: GSFC___, LaRC___, ASF___, EDC___, JPL___, NSIDC___, ORNL___ EOC:___				2. CCR No.
3. Submitted Date:	4. Revision	5. Priority Emergency ☐ Urgent ☐ Routine ☐	6. Change Class	7. Status
8. CCR Title:				
9. Originator: Org: e-mail: phone: 10. Approval:_____ _____ signature date				
11. Reason for Change (indicate attachment ___)				
12. Description of Change (indicate attachment ___)				
13. Impact Analysis: Cost: ☐ None ☐ Small ☐ Medium ☐ Large (Not exceeding $100,000) ($100,000 to $500,000) (Over $500,000) Evaluation Engineer: Org: e-mail: phone: Impact Evaluators: ESDIS___; ECS Dev___; SEO___; SMC___; DAACs: GSFC___, LaRC___, ASF___, EDC___, JPL___, NSIDC___, ORNL___; EOC___; Others_____ (indicate attachment ___)				
14. Comments: (Indicate Sites/ Organizations Affected) (indicate attachment ___)				
15. Board Action: ☐ Approved ☐ Withdrawn ☐ Disapproved ☐ Deferred Until_____ date Further Action Required: ☐ ECP ☐ Waiver ☐ Deviation ☐ Tech Direction ☐ Contract Mod. ☐ DCN Other:_____				
16. CCB Approval Chair:_____ _____ signature date			17. CCR Implemented CM Admin. signature:_____ date:_____	

Figure 9.2.4-1 ECS Configuration Change Request (CCR)

The following enumerated text corresponds to the numbered items on the CCR form:

(1) **Change Control Board (CCB) --** The designated CCB is checked-off for changes processed by the ESDIS Change Control Board (CCB) and its ECS site-level chartered CCBs at the SMC, EOC, and DAACs (GSFC, LaRC, ASF, EDC, JPL, NSIDC, and ORNL).

(2) **CCR Number --** The unique serialized CCR number is applied at each site.

(3) **Submitted Date --** The date that the CCR was prepared is documented.

(4) **Revision --** The current revision is designated for tracking changed versions of original CCR.

(5) **Priority --** The priority level of the CCR is assigned. Emergency CCRs may have already been implemented on a temporary basis by the Trouble Ticket Review Board (TTRB) with concurrence from the CCB Chair who later receives the CCR to document /implement the permanent change. Urgent items will be reviewed by the next CCB meeting. Routine items will be reviewed as soon as the schedule permits.

(6) **Change Class --** Change Classes are either I or II. Class I will be handled by ESDIS-only because of cost, schedule, and/or mission impacts that may require requirements changes. Class II items do not affect mission requirements, but may have cost and/or schedule implications which affect maintenance, operations, procedures, documentation, site-tailored items, COTS implementation, site installations of core system changes, science SW changes, etc.

(7) **Status --** The following table is a summary of the CCR states maintained by the Distributed Defect Tracking System (DDTS) application SW database tool that implements the Change Request Manager. Note that the hard copy form will not be updated chronically, but will be kept in the master suspense file of the CM Administrator until closed-out with a stamp (item #7 & 15) and appropriate signatures (viz., items 16, & 17).

State Table Composition in DDTS format

State Code	Available States	State Assigned
S	Submit	Submitted
N	New	New
A	Assign-Eval	Assign-Eval
O	Assign-Implement	Assigned-Implement
R	Implement	Implemented
T	Assign-Verify	Assigned-Verify
V	Verify	Verified
C	Close	Closed
D	Duplicate	Duplicate
F	Forward	Forwarded
P	Defer	Deferred

Explanations of DDTS' State Table Content:

Uppercase character in the 1st column is the character stored in the change request record to indicate what state a change request is in. DDTS uses this character to go into the table and extract the descriptive name for display in reports.

Names in the second column is the state in the present tense. They are shown on the DDTS list of states that are available for selection during input. It's also used by some of DDTS' query and report code. It facilitates querying based on descriptive names opposed to a single letter.

Names in the third column is the state in the past tense. They are shown on the DDTS change request record. It's also used by some of DDTS query and report code. It facilitates querying based on descriptive names opposed to a single letter.

Definitions (a state is the stage that a proposed change has reached in its life cycle.):

New - the initial state for all newly entered change requests.

Assign-Eval- state entered when the change request is being assigned to an engineer for evaluation/analysis.

Assign-Implement- state entered when the change request is being assigned to an engineer for development.

Implement-state entered when the proposed change has been developed.

Assign-Verify-state entered when the developed change is being assigned to an engineer for verification testing.

Verify- state entered when a developed change has been tested and verified that it functions properly.

Close- state entered when all activity specified in the change request has been completed or that the approval authority has decided to close it prior to completion of all activity.

Duplicate-state entered when a change request is determine to be duplicate of an existing change request. Duplicate change request identifies change request being duplicated.

Forward-state entered when a change request needs to be forwarded to another DDTS defined project (In DDTS terminology, a project is a grouping of change requests. For example, a change request from a site project can be forwarded to an ECS project.).

Defer- state entered when activity on a change proposal has to be postponed.

(8) **CCR Title --** The CCR title is supplied by the originator.

(9) **Originator --** The originator name, organization, e-mail address, and phone number is given.

(10) **Approval --** The CCR is approved by the designated management authority which is assigned by the CCB. This sponsorship requirement acts as a primary filter to eliminate from consideration those CCRs that cannot be implemented or which have no ECS site management support.

(11) **Reason for Change --** The reason for the change is narrated on the form and/or the designated attachment.

(12) **Description of Change --** The proposed implementation of the change is narrated along with any known impacts, resources, and expenses to be incurred.

(13) **Impact Analysis --** Impact analysis is documented in the form of figure 9.2.4-2. The impact analysis is collected by the CCB Chair appointed Evaluation Engineer in coordination with the CM Administrator who maintains the CM records and assembles the review package for the CCB. The Evaluation Engineer documents the list of Impact Evaluators and derives and/ or verifies cost, technical, and schedule impact of the proposed change based on all inputs received. The results of the coordinated CCR Impact Analysis inputs are presented in the CCR Impact Summary form shown in figure 9.2.4-3 part of the CCR review package.

CCR Impact Analysis

Responder Request Number: ____
Responder:_____
Responder Point of Contact:
address:_____
_____
phone:_____
e-mail:_____
CCB Schedule Date:_____
CCR Number:_____
CCR Log Date:_____
CCR Originator:_____
CCR Originator Point of Contact:
address:_____
_____
phone:_____
e-mail:_____

Evaluation Engineer:_____
Evaluation Engineer Point of Contact:
address:_____
_____
phone:_____
e-mail:_____
Requested Return Date:_____

Rough Order of Magnitude (ROM) Impact Analysis

Basis of Estimate:

Technical Assumptions and Comments:

Cost Impact:
None [ ]
Small [ ] < $ 100, 000
Medium [ ] $100,000 < x < $500,000
Large [ ] > $500,000

Schedule Impact:

Technical Assessment: (Your impact analysis should consider the implementation approach; interfaces affected; HW or SW changes required; documentation changes required-- change from/to pages; suggested alternatives, if any; and impact to security features. If your system is not impacted, please provide that information to the CM Administrator.)

Comments:

Signed:_____
(Responder)

Date:_____

Figure 9.2.4-2: ECS CCR Impact Analysis

CCR Impact Summary

Evaluation Engineer:_____
Evaluation Engineer Point of Contact:
address:_____
_____
phone:_____
e-mail:_____
CCR Board Date:_____

Resources Summarized:

Technical Summary:

ROM Summary (BOE, Cost, and Schedule):

Recommendation:

Signed:_____
(Evaluator)

Date:_____

Figure 9.2.4-3: ECS M&O CCR Impact Summary

(14) **Comments** -- Comments are added to the CCR to summarize sites and/ or organizations affected by the CCR. Additional comments may address proposed CCB dispositions and recommendations to be indicated by resolutions in item #15.

(15) **Board Action** -- CCB actions and follow-up actions that will be facilitated and tracked by the CM Administrator are indicated. Possible CCB dispositions are given as approved, withdrawn, disapproved, and deferred (pending follow-up activities by the indicated schedule date). Further actions are indicated as

Engineering Change Proposal (ECP)-- changed scope of contract requirements

Waiver-- declaration that certain contract requirements no longer apply

Deviation-- change of contract terms or substitution of terms or deliverable requirements

Technical Direction-- order by Contracting Officer's Technical Representative (COTR) to perform certain tasks within the scope of the contract

Contract Modification-- changes to the terms of a contract

Document Change Notice (DCN)-- notification of changes to published documents

Others-- Engineering Change Notice, Change Order, Escalate to higher CCB authority, etc.

(16) **CCB Approval** -- CCB approval signature authority by CCB Chair or designate.

(17) **CCR Implemented** -- This signature and close-out stamp (item #7) are executed by the CM Administrator witnessing the completion of the CCR implementation process which is tracked in the Change Request Manager automated tool DDTS and updated in Baseline Manager (XRP-II) for affected version control status changes.

9.2.4.2 Change Control Board Process (System and Site-level CCBs)

The ECS M&O organization will provide administrative and technical support services for the CCB at each site. Each site's CCB is controlled by the host site organization and provides the authority and direction for the ECS contractor to modify the operational baseline. The ESDIS CCB has chartered an ECS Review Board to coordinate ECS system-level changes and problem management via the Sustaining Engineering Organization (SEO) contractor and on-site Review Boards that also act as site CCBs. This is illustrated using the CM Administrator's workflow for the SEO support of the ECS Review Board in figure 9.2.4-4 and the On-Site CM Administrator's workflow for SEO support of the on-site CCB in figure 9.2.4-5. The problem management process was discussed in detail in section 8 of this document. Both diagrams illustrate the flow of CCRs through the respective CCBs with inputs from the review boards and evaluators that determine the disposition of proposed changes. Details of this process are given below:

System-level Change Control Procedures

(The enumeration corresponds to the diagram of figure 9.2.4-4)

(1) Configuration Change Requests are received by the SEO CM Administrator from all sources with regard to the operational ECS Core System as described in section 9.2.4.1. These changes designated as from other sources could involve system enhancements, procedures, interfaces (both external and internal), documentation changes, etc. that are not the subject of contemporaneous problem reports which would be first deliberated by the Trouble Ticket Review Board (TTRB) and/ or Failure Review Board as explained below.

(2) Proposed common baseline changes will be proposed based on Trouble Ticket (TT) resolutions obtained from the respective review boards (see section 8 for details). The respective TT would be closed via a corresponding CCR to either ratify, i.e., to make permanent the prior temporary/ emergency action taken by the TTRB or to consider normal priority (scheduled) changes for incorporation into future change releases.

(3) The SEO CM Administrator is responsible for logging the CCR into the Change Request Manager (DDTS tool) as described in section 9.8.

(4) The CCB chair assigns an evaluator and the SEO CM Administrator coordinates impact assessment.

(5) Class I change requests (proposed changes that affect controlled milestones, schedules, budget, cost and requirements) are forwarded to the ESDIS CCB for consideration with recommendations from the ECS Review Board.

(6) Class II change requests (proposed changes affecting documentation, hardware (alternative use of software (correction of errors), and COTS substitution without a Class I impact) are considered by ECS Review Board deliberations.

(7) Notice of proposed changes is distributed to affected parties and review board members to obtain and coordinate impact assessment and optimize the approach to implement proposed changes.

(8) The results of ECS Review Board deliberations are factored into review board resolutions which determine whether, when, or where the system changes will be implemented.

(9) Approved changes are processed by the SEO CM Administrator to the support activities, i.e., site CCBs, support personnel (SEO), vendors, etc. who are provided with change orders, schedule, and implementation instructions.

(10) Disapproved changes are processed by the SEO CM Administrator via official notifications, memo to the file, and update of the Change Request Manager (CRM).

(11) The SEO CM Administrator tracks implementation and closure of CCRs via directions to implementing organizations and their acknowledgements using the CRM tracking and statusing features (see section 9.8).

(12) New versions and/ or maintenance updates are annotated in Baseline Manager at the SMC and at the affected sites by following the procedures for configuration identification, activation dates, deactivations dates, and issuing version description documents.

(13) Simultaneously, the SW Change Manager (ClearCase) is updated with directory trees, installation files, and software as required by SW maintenance.

(14) Status of this activity to implement changes and assigned responsibilities is tracked through closure in the CRM at SMC and at the sites.

(15) The databases are synchronized by manual checking between applications (Baseline Manager vs. CRM vs. SW Change Manager) and automated verification by the SW CM Manager for purposes of SW distribution and maintenance.

(16) The TT Review Board is empowered to make emergency fixes without common baseline changes and update these changes directly to Baseline Manager with documentation to follow via the CCR submitted to the appropriate CCB. Proposed common baseline changes must be submitted by CCR to the ECS Review Board.

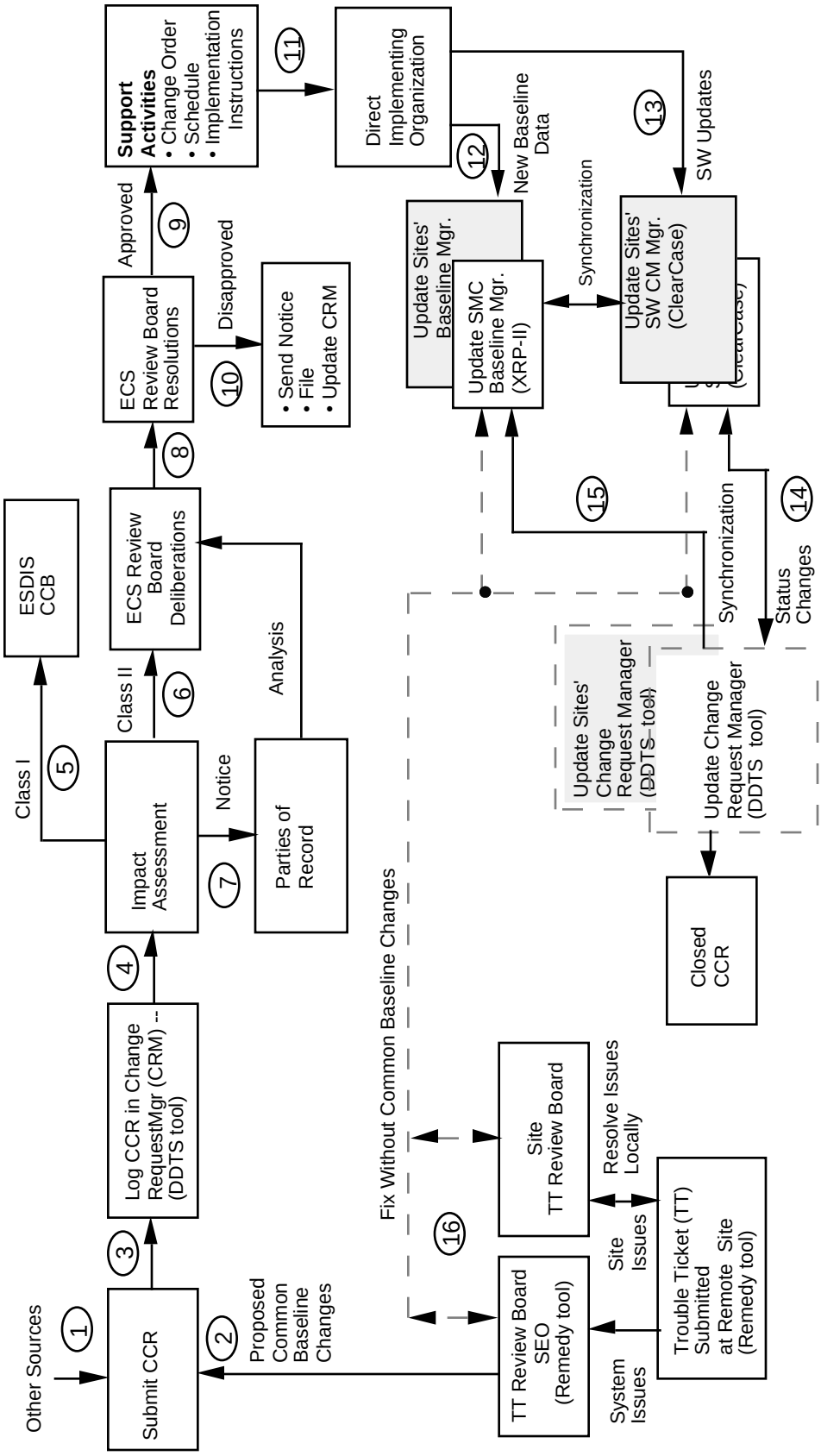

Figure 9.2.4-4: Work-Flow Diagram for SEO CM Administrator

Site-level Change Control Procedures

(The enumeration corresponds to the diagram of figure 9.2.4-5)

(1) Configuration Change Requests are received by the Site CM Administrator from all sources with regard to the **site unique extensions** to the operational ECS Core System as described in section 9.2.4.1. These changes designated as from other sources could involve system enhancements, procedures, interfaces (both external and internal), documentation changes, etc. that are not the subject of contemporaneous problem reports which would be first deliberated by the Site/ SEO Trouble Ticket Review Board (TTRB) and/ or Failure Review Board as explained below.

(2) Proposed site baseline changes will be proposed based on Trouble Ticket (TT) resolutions obtained from the respective review boards (see section 8 for details). The respective TT would be closed via a corresponding CCR to either ratify, i.e., to make permanent the prior temporary/ emergency action taken by the TTRB or to consider normal priority (scheduled) changes for incorporation into future change releases.

(3) The Site CM Administrator is responsible for logging the CCR into the Change Request Manager (DDTS tool) as described in section 9.8.

(4) The CCB chair assigns an evaluator and the Site CM Administrator coordinates impact assessment.

(5) Class I/ System Issues change requests (proposed changes that affect controlled milestones, schedules, budget, cost and requirements) are forwarded to the ECS Review Board for consideration with recommendations from the Site CCB. Class I issues are further forwarded with recommendations by the ECS Review Board to the ESDIS CCB for consideration.

(6) Class II change requests (proposed changes affecting documentation, hardware (alternative use of software (correction of errors), and COTS substitution without a Class I impact) are considered by Site CCB deliberations.

(7) Notice of proposed changes is distributed to affected parties and review board members to obtain and coordinate impact assessment and optimize the approach to implement proposed changes.

(8) The results of Site CCB deliberations are factored into CCB resolutions which determine whether, when, or where the system changes will be implemented.

(9) Approved changes are processed by the Site CM Administrator to the support activities, i.e., other CCBs, support personnel (SEO), vendors, etc. who are provided with change orders, schedule, and implementation instructions.

(10) Disapproved changes are processed by the Site CM Administrator via official notifications, memo to the file, and update of the Change Request Manager (CRM).

(11) The Site CM Administrator tracks implementation and closure of CCRs via directions to implementing organizations and their acknowledgements using the CRM tracking and statusing features (see section 9.8).

(12) New versions and/ or maintenance updates are annotated in Baseline Manager at the affected sites and the SMC by following the procedures for configuration identification, activation dates, deactivations dates, and issuing version description documents.

(13) Simultaneously, the SW Change Manager (ClearCase) is updated with directory trees, installation files, and software as required by SW maintenance.

(14) Status of this activity to implement changes and assigned responsibilities is tracked through closure in the CRM at the sites.

(15) The databases are synchronized by manual checking between applications (Baseline Manager vs. CRM vs. SW Change Manager) and automated verification by the SW CM Manager for purposes of SW distribution and maintenance.

(16) The on-site TT Review Board is empowered to make emergency fixes without common baseline changes and update these changes directly to Baseline Manager with documentation to follow via the CCR submitted to the appropriate CCB. Proposed common baseline changes must be submitted by CCR to the ECS Review Board.

Each site's CCB accepts initial release or updates from the ESDIS CCB. Similarly, the Distributed Active Archive Center (DAAC) CCBs will accept product generation software from an ESDIS authority. Local tailoring and installation decisions are determined by the site CCB.

In the case of Evaluation Package (EP) and Prototype deliveries, the ECS CCB as directed by ESDIS will provide a configured, documented, executable with supporting files. Again, installation decisions are determined by the site CCB.

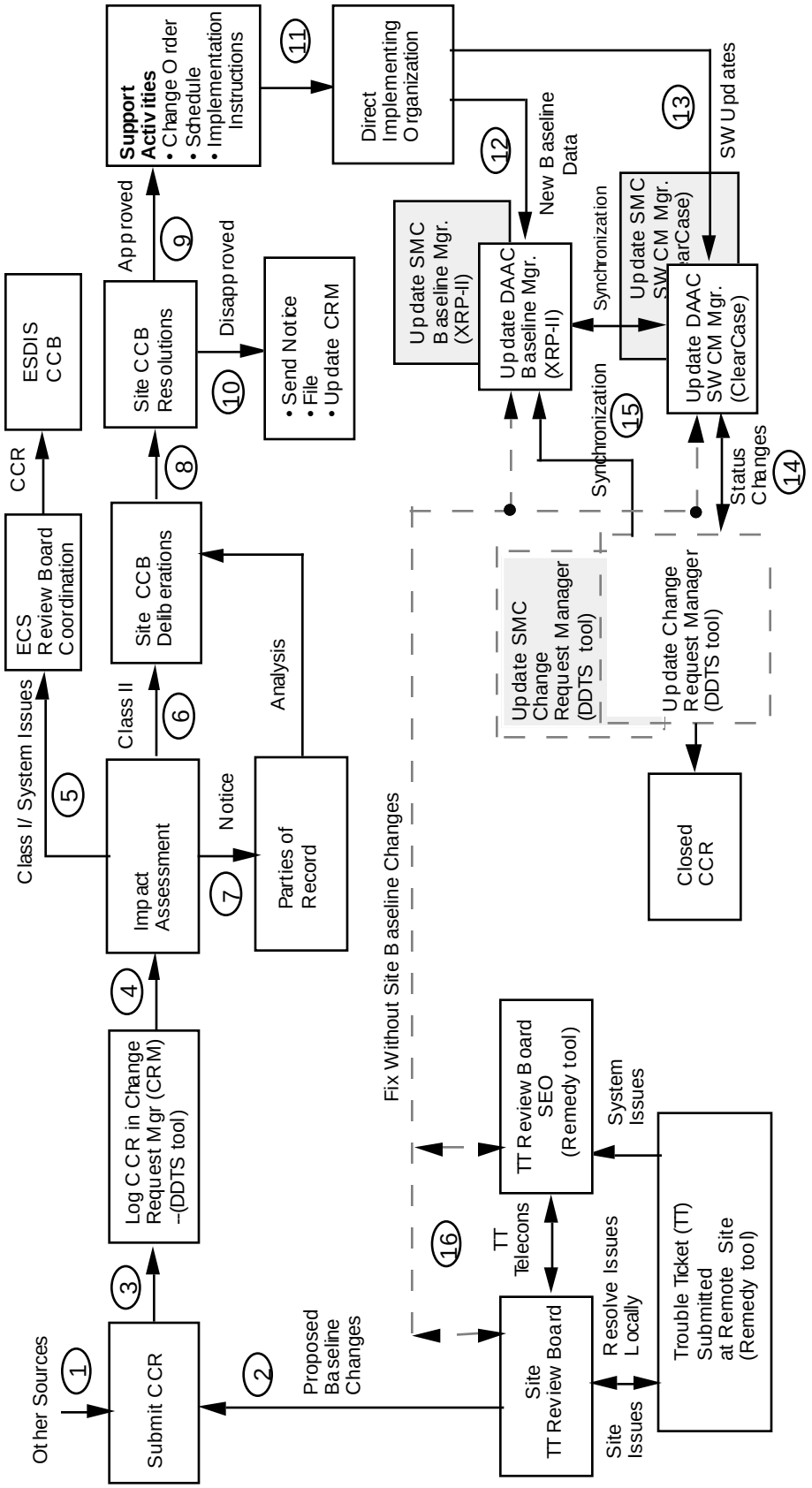

Figure 9.2.4-5: Work-Flow Diagram for Site-level CM Administrator

Each Science Computing Facility (SCF) is assumed to have a configuration control function. For commonality with other sites, it is assumed that this function will be performed by a CCB. A major difference, though, is the ECS contractor does not have an active role in the support of this CCB.

The SCF CCB will provide two types of configuration control:

(1) Configuration control of software and databases that are to be executed in another site's environment. In this mode, it operates very much as the ECS CCB does to establish a product baseline.

(2) Configuration control of SCF resources that are made available to the EOSDIS community. In this mode, its functions are the same as a DAAC CCB.

The ECS M&O CM function at each DAAC will accept science SW and data items from the SCF CCB. These items will be incorporated into the DAAC's operational baseline as directed by the DAAC CCB.

The EOC CCB will control the operational configuration of the required EOC operational baseline. ECS M&O CM will provide services as directed by the CCB.

The ECS Review Board will be charged with the responsibility for centralized coordination and control of ECS CM activities to ensure:

- ECS integrity and quality of service
- Successful coordination with both internal and external networks, systems,

  and on-site facilities
- Timely ESDIS CCB visibility into and oversight of ECS operations
- Convenient user administrative services

9.2.4.3 Configuration Control - Deviation and Waivers

1. Prior to completion of software development or to purchase of equipment or software, a Deviation from the specification may be granted by the ESDIS CCB.

2. Subsequent to the completion of development or delivery of equipment or software, a Waiver of specific requirements may be granted in order to accept defined nonconforming items. The waiver is traceable to a nonconformance report. A waiver is limited. Additional deliveries of like items must conform to approved requirements .

3. Departures from expected configurations that are not at variance with customer-approved requirements are handled as Nonconformance Reports.

4. A request for a deviation or waiver consists of a deviation/waiver form shown in figure 9.2.4-6 attached to a CCR form .

5. Instructions for completing the form are listed below. Additional pages should be attached as necessary.

   Dev or Wai: Check the applicable box in accordance with the definitions given on page 1 of this Instruction.

   Waiver Number: Assigned by ECS CM Administrator

   Title: Enter a brief descriptive title. The title should be a statement, e.g., "Accept x in lieu of y".

   Reason: Describe the reason for the deviation or waiver. This may also include the history of the problem and consequences of not implementing the deviation/waiver.

   Existing Requirement: Specify and describe the baseline from which the deviation or waiver departs.

   Departure: Give instructions for the deviation or waiver with reference to the requirement.

   Implementation Scope: Include as appropriate, configuration item number, model no., supplier, subcontractor, series, serial numbers, order no., location, release number, quantity, time period or other criteria delimiting the deviation or waiver.

   Documents Affected: List current release number(s) of affected document(s).

6. The deviation or waiver CCR is prepared in accordance with the instructions in section 9.2.4.1 with the following exceptions:

   Change Class: All deviations and waivers are change class I because they depart from approved requirements and must be approved by the ESDIS CCB.

   Description (Title): The title of the CCR will be the deviation or waiver title.

   Proposed Solution: Enter "See Attached Deviation/Waiver form ."

7. Waiver and deviation CCRs are submitted to the ECS CCB. Upon ECS CCB approval, the CM Administrator forwards the CCR to ESDIS CCB for authorization to implement the deviation or waiver.

8. When the deviation or waiver is authorized, the ECS CM Administrator immediately distributes the authorization information to the appropriate implementors and issues a document change order (DCO) to the Document Management Organization.

9. The SEO Librarian copies the implementation instructions into the list of deviations and waivers at the front of the document and inserts the deviation/waiver number and effectivity at the point of applicability within the document.

10. Approved deviations/waivers are published via Document Change Notices (DCNs). Adding the deviation/waiver information to the document makes its status general knowledge. However, the deviation or waiver is in effect as soon as it is authorized by the customer .

11. A change in scope, effectivity or closeout, or any other change in a deviation or waiver requires a new CCR. The closeout or change is applied to the document via a Document Change Order in the same procedure as given in paragraphs 7 through 10.

ECS Deviation / Waiver

Deviation/Waiver No.	Deviation ☐ Waiver ☐	Date:
NCR No.		
Title:		
Reason for Deviation / Waiver:		
Existing Requirement: (attach pages as needed)		
Departure: (attach pages as needed)		
Implementation Scope: (Identify CI, model, supplier, subcontractor, series, order no., location, release, time period, etc. as applicable)		

Document No.	Page/Paragraph Reference	Document Title

CM05MR95 ***ECS***

Figure 9.2.4-6: Deviation/ Waiver Form

9.3 Configuration Status Accounting Procedures

9.3.1 Purpose

Operational phase configuration status accounting (CSA) consists of recording and reporting information about the configuration status of the ECS Project's documentation, hardware and software throughout the Project life cycle. Periodic and ad hoc reports keep ESDIS informed of configuration status as the operational mission evolves. Reports to support reviews and audits will be extracted as needed starting from the RRR.

The Baseline Manager tool described in section 9.9 records and tracks as-built products designated as ECS control items (i.e., custom, COTS, science, toolkits, etc. SW and HW items along with their associated documentation and records) and historical versions of ECS operational configurations. Baseline Manager, which is updated with the acceptance tested version of the ECS baseline at RRR, records and reports M&O document change status and histories, mission milestone baselines, and change status.

CSA entails maintaining version histories of delivered and maintained products as well as histories of operational baselines and changes made to each baseline. Additionally, CSA tracks the status of proposed changes from initial CCR submission to ultimate disposition and/or implementation. CSA also maintains historical records of CCRs.

9.3.2 Applicable to

All ESDIS chartered CCBs.

9.3.3 References

ESDIS CM Plan

ECS M&O CM Plan

9.3.4 Procedures

The following are topical items subject to periodic or ad hoc reporting on behalf of the respective CCB or a system-level summary of information that will be reported by the SEO CM Administrator representing the operational baseline for all the ECS sites.

(a) **New CCRs and Revisions.** This is a standard Change Request Manager report (cf. section 9.8). This report will be issued monthly and summarized annually.

(b) **CCB Review.** Distribute CCR copies for review (and Impact Analysis forms if applicable). Print the agenda and distribute prior to the meeting.

(c) **Open Action Items.** Open action items should be statused regularly between meetings.

(d) **CCB Meeting.** Record the CCB's disposition of each CCR.

(e) **Record Action Items.** Record actions, assignments, and due dates.

(f) **SEO Librarian Maintained Document Changes.** When all authorized document changes have been accomplished prepare DCN, post the final version on the ECS Document Data Server and distribute hardcopy as required.

(g) **Minutes Distribution.** Distribute minutes to the standard distribution and inform actionees of assigned action items.

(h) **CCR Implementation Status.**

- After CCB disposition, regularly status open CCRs until closure.

- Class I events include: CCR to ECS Review Board for review/ appoval; Technical Review Board; and ESDIS Disposition

- Further events are as follows for M&O implementation status: Consent Obtained; Item Received; Installed; Document Completed; etc.

- CCR CLOSED: A Class I CCR is not closed until the ESDIS contract officer's authorization is received or the reference CCR has been withdrawn.

- Class II document change CCRs may be closed with the CM Administrator's issuance of the DCN.

- Other non- document change CCRs may be closed when the originator verifies to the CM Administrator that all specified changes have been implemented.

9.4 Configuration Audits

9.4.1 Purpose

SEO will support Functional Configuration Audit /Physical Configuration Audit (FCA/PCA) by IATO at RRR. SEO will also support audits by ESDIS and our own Quality Office functions. Internal CM self-audits will be conducted by the SEO. Self-audits evaluate the Project's compliance with the EOS Configuration Management Plan and the ESDIS CMP. The CM self-audits will verify:

- That CM policies, procedures, and practices are being followed.
- That approved changes to documentation, and to software and hardware products are properly implemented.
- That the as-built documentation of each CI agrees with the as-deployed configuration or that adequate records of differences are available at all times.

A post-audit report is written outlining the specific items audited, audit findings, and corrective actions to be taken. All action items are tracked to closure.

In addition, SEO supports formal audits scheduled and conducted by ESDIS. These audits are conducted to validate that each ECS CI is in conformance with its functional and performance requirements defined in the technical documentation. The audits validate that:

- The as-built configuration compares directly with the documented configuration identification represented by the detailed CI specifications.
- Test results verify that each ECS product meets its specified performance requirements to the extent determinable by testing.
- The as-built configuration being shipped compares with the final tested configuration. Any differences between the audited configuration and the final tested configuration are documented.
- When not verified by test, the compatibility of ECS products with interfacing products or equipment is established by comparison of documentation with the interface specifications which apply.
- COTS products are included in audits as integral parts of the ECS baseline.

9.4.2 Applicable to

All ESDIS chartered CCBs.

9.4.3 References

ESDIS CM Plan

ECS M&O CM Plan

9.4.4 Procedures

The audits willl be standardized for a limited set of issues that drive the process for which the audit is taken, viz., FCA/PCA, Security Issues, General Accounting, Test Readiness Review, or Operational Certifications. The documented basis for the audit process will be maintained in the Baseline Manager CM tool (cf. section 9.9). Alternatively, the Version Description Document (VDD) will be used to document auditable changes to configured articles that are issued at the ECS configuration item (CI) level. The use of the VDD is discussed in the ECS M&O CM Plan. The VDD will contain the prioritized current status summary of any Trouble Tickets/Discrepancy Reports against the CI that is being issued per the change request.

Some general guidelines and/ or items that must be tailored for the specific size and scope of configuration audit to be conducted include:

(a) Audit Plan;

(b) Conference Agenda;

(c) Location to collect and analyze data; conduct meetings;

(d) Applicable specifications, drawings, manuals, schedules, design and test data;

(e) Test Results Analysis;

(f) Meeting minutes including resulting audit action items;

(g) Tools and inspection equipment necessary for evaluation and verification;

(h) Unencumbered access to the areas and facilities of incoming inspection, fabrication, production, and testing;

(i) Personnel from each engineering, production, and quality department to be available for discussion of their respective areas;

(j) Copies of inspection reports, process sheets, data sheets, and other documentation deemed necessary by the Government FCA/ PCA teams; and

(k) Isolation of the item(s) and detailed parts to be reviewed.

9.5 Data Management

9.5.1 Purpose

The term "data management" pertains to two activities. The first pertains to the activities of the Data Management Organization (DMO) within the ECS project. The second, broader in scope, includes all organizing and use of documents and data across the ECS project. This procedure describes the DMO activities fully. In addition, certain activities that are material to the data management of the project are described in this procedure although they are performed by organizations other than the DMO.

This procedure describes:

- the policies and procedures that apply to data handling and document distribution.
- requirements for data management for the ECS project.
- the role of the data base administrator .
- the use of data control and data handling systems (Document Data Handling Subsystem (section 20).
- the activities pertaining to establishing and maintaining system libraries and records.
- management of data required during operations readiness review, missions operations, and certification and to assist the on-going development of the system for design, implementation, and test.
- how data will be collected, maintained, and made available to the development team and for distribution to the NASA.
- the data management functions of controlling document masters, preparing change pages, and keeping auditable change records.
- the plan for controlling the data base structure, controlling the interfaces to the data base, establishing the data base security, and evaluating data base performance.

This procedure does not cover the handling or use of notes, test data, software, financial information, or draft documents that would generally be characterized as working papers or other non-controlled and non-deliverable information. This information is handled by the contractor Integrated Management Information System (IMIS).

9.5.2 Applicable to

All ECS Sites CM Administrators and the SEO Librarian

9.5.3 References

ECS Data Mangement Plan

ECS Documentation Management and Control	DM-1-001
Documentation Numbering	DM-1-002
CDRL and Required Document Generation, Review, Release, and Maintenance	DM-1-004
Electronic CDRL Preparation and Delivery	DM-1-005
CDRL Document Format	DM-1-006
Document Delivery and Dissemination	DM-1-007
ESDIS/ECS Review of Contract Required Data	DM-1-008
ECS Documentation Storage	DM-1-009
Document Archiving	DM-1-010
Technical and White Paper Generation, Review, Release, and Maintenance	DM-1-013
Electronic Storage and Distribution of ECS Documentation	DM-1-014

9.5.4 Procedures

The following text describes standard data management procedures and methods to be used by the ECS project. Occasionally special circumstances may arise which call for exceptions and flexibility to the customary procedures.

9.5.4.1 Information Preparation, Submittal, & Cataloguing

9.5.4.1.1 Creation / Preparation

The originator / author (usually engineering) will create all source material (text, graphics files, etc.) per CDRL / DID preparation instructions and be accountable for the accuracy of its content. Publishing will assist the author by providing Word Processing and Graphics support such as templates and fonts. (Publishing will do the final formatting later.) The DMO will provide the appropriate CDRL numbering and DID instructions.

9.5.4.1.2 Submission

The originator / author will submit all source material (text, graphics files, etc.) to the DMO electronically including necessary metadata descriptors. The latter include reference to source documents and dates.

The Data Management Office verifies delivery schedule with the appropriate task manager prior to a scheduled release or CDRL delivery date. The DMO notifies the responsible organization at the Program Office Weekly Status Report of upcoming CDRL items and their delivery dates, any special preparation instructions, formats, title pages, signature approvals, and any other pertinent information. Copies of the ECS Master Schedule are provided at the Weekly Status Review.

9.5.4.1.3 Identification and numbering

Data Identification. Upon receipt of information, the SEO Librarian assigns a DMO identification number to each pertinent type of program data created for the ECS program. If appropriate both SEO and NASA numbering are assigned at this time.

9.5.4.1.4 Logging / Cataloguing

The DMO verifies proper submission of information into the system including valid numbering, manually making changes if necessary, and provide supplementary cross-references as part of the data base catalogue. DMO also updates the status log for those submissions that were pre-scheduled.

9.5.4.2 Information Review, Signoff, Release and Change/Revision

9.5.4.2.1 Document/Test data Review, Release, and Change Procedures

(ESDIS/ ECS Review) of Contract Required Data (DM-1-008)

9.5.4.2.2 Review/Release

Prior to its release, each CDRL document will be reviewed and signed off by each of the participating functions involved (e.g., engineering, product assurance, systems engineering) as depicted in Figure 9.5.4-1. Only when all the proper signatures have been obtained will the document be released and distributed.

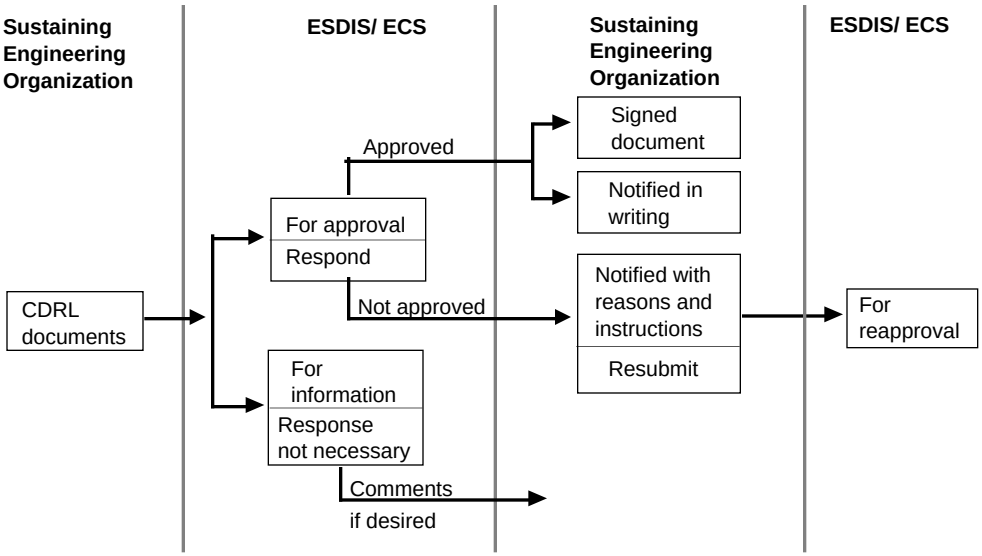

Figure 9.5.4-1. CDRL Item Submission Criteria Flow

The DMO will verify that review and signoff has been completed and annotate the status log for the respective information accordingly.

Data Control Procedures:

1 Data Item Scope, Content, and Format

2 Data Item Submittal (Schedule and Distribution)

3 Data Item Use of Common Information

4 Data Not Duplicated

5 Data Item Quality Control and Assurance

6 Data Item Approval

7 Internal Data

8 Data Items Rework

9 Recorded Information

9.5.4.2.3 Changes, Revision and Document Maintenance

Changes to controlled documentation come under control of the appropriate Change Control Board (CCB) and details concerning the procedure are to be found in the Configuration Management Plan. In summary, once the author (usually engineering) and the CCB agree on a change, the DMO is mandated to reflect the change in the data and documents. Changes to other data come under control of the appropriate task manager.

Once information is released, no changes will be permitted except upon the instruction of the appropriate authority (CCB or task manager). Changes to specifications are submitted to a formal change review board, which repeats the review/approval process (described above).

The DMO receives the document with approval signatures and reviews for compliance with the SOW, DID, and other contractual requirements. If found to be deficient, the document is returned to the author for corrections.

Revision and resubmission of any CDRL item will be subject to the same submission criteria as applied to the initial release of the document. The DMO will store a file copy and include information about updates in the next status report. The DMO will maintain a detailed data catalog and provide, as requested, specific indices that include document revisions and issue dates.

9.5.4.3 Information Distribution and Submission to ESDIS/ ECS

9.5.4.3.1 Data / Document Distribution/Submittal to ESDIS/ ECS

ESDIS/ ECS will receive preliminary versions of data for comments prior to final release. After data in final form is received and cataloged, the DMO will reproduce the data, if necessary, and make distribution in accordance with CDRL/DID instructions and 500-TIP-2601 delivery interchange standard. The DMO will maintain special distribution lists (sorts) for any requirement that may occur. For documents transferred electronically, the Document Data Server Subsystem will encode and transmit the documents to ESDIS/ ECS and will prepare and deliver a backup disk or tape for each document in the appropriate format.

All contractual data submitted to ESDIS/ ECS, both engineering and non-engineering, will have a standard transmittal sheet attached. This sheet will contain key information about the data being submitted, such as data number, description, submission criteria, format.

9.5.4.3.2 Categories of CDRL Data Submitted to ESDIS/ ECS

All CDRL data submitted to ESDIS/ ECS will be classified as being *for information* or *for approval*

1) For Information. – Routine documentation which will be evaluated by ESDIS/ ECS to determine current program status, progress, and future planning requirements. Examples of *for information* documents include status reports and programs management directives. *For information* documents shall be sent to ESDIS/ ECS as soon as approved and issued by the SEO. ESDIS/ ECS may elect to provide comments, although a formal ESDIS/ ECS response is not required.

2) For Approval. – Documentation that requires written approval from ESDIS/ ECS before its acceptance, distribution, and intended use. Examples of *for approval* documents include all documentation that is required to come before a CCB. ESDIS/ ECS will approve the document or ask for resubmission at ESDIS/ ECS Program Office. Provisions will be made for ESDIS/ ECS signature on the cover of documents submitted for approval. If the document is approved, ESDIS/ ECS will sign and return the document and notify SEOin writing of the approval. If the document

is not approved,within a mutually agreed time, ESDIS/ ECS will notify SEO of those parts of the document which cannot be approved, together with the reasons and instructions concerning resubmission of the document. If the ESDIS/ ECS evaluation reveals inadequacies, ESDIS/ ECS will inform SEO of the parts of the document that require alterations, recommend actions, and give resubmission instructions according to the character of the inadequacies. SEO will resubmit the document to ESDIS/ ECS for approval after receipt of ESDIS/ ECS's notification.

9.5.4.3.3 Documentation Distribution

The DMO will prepare approved CDRL(s) transmittal letters. The DMO will reproduce copies of the letter and data package as required by the CDRL, ship it to those on the approved distribution list, and provide internal distribution as appropriate.

9.6 Archiving Procedures for the SW CM Manager (ClearCase)

9.6.1 Purpose

These instructions establish Configuration Management procedures for the backup of ClearCase Version Object Base (VOB) data, Views, and data delivered to the customer.

9.6.2 Applicable to

All ECS CM Administrators, SW Maintenance Engineers, and Sustaining Engineers

9.6.3 References

Configuration Management Plan for the ECS 101-102-MG1-001

CCB Processes CM-1-004
Configuration Control of Formal Track Software CM-1-010
Configuration Control of EP Software CM-1-016
Configuration Control of Prototype Software CM-1-018
Software Development Library CM-1-019
EDF Configuration Control SE-1-002

9.6.4 Procedures

DEFINITION

ECS Development Facility (EDF) - the software development environment including data, hardware, software, networks, facilities, and procedures used to support ECS software development and testing.

Software - for the purpose of this instruction, software includes all ECS-developed application software, COTS software, build and environmental instructions, and databases used in the execution of these products.

Segment-level - for the purpose of this instruction, segment-level includes all software development undertaken in the EDF by ECS segments from the initiation of software coding through completion of segment integration and test (I&T).

System-level - for the purpose of this instruction, system-level includes all ECS integration and test activities beginning with installation of segment software in the system I&T files.

Software Development File - a repository for a collection of material pertinent to the development or support of software.

Thread - a set of components (software, hardware, and data) and operational procedures that implement a scenario, portion of a scenario, or multiple scenarios.

Build - An assemblage of threads to produce a gradual buildup of system capabilities.

VOB - Version Object Base. Secure, permanent, mountable file system. Repository for storage of version-controlled data.

View - A unique workspace management or "sandbox management" that provides developers with transparent, file-level access to any version of any element through the use of dynamically-evaluated, user-specified version selection rules.

GENERAL

1. System Administrators maintain a backup for all ECS systems. This procedure documents an additional backup procedure for only ClearCase-specific data. This process is in parallel with System Administrator procedures. ClearCase, the ECS level software tracking tool, contains within itself a number of repositories called Version Object Bases (VOBs). These VOBs maintain all versions of all software elements developed for the ECS project. Additionally, there are disk areas known as Views, which contain file(s) that may be newly created or modified but not yet given or returned to ClearCase control.

2. It is critical that these repositories, VOBs, and Views get backed up synchronously on a daily basis, and that the backup tapes be maintained in such a way as to guarantee their restoration to the system in the event of a catastrophic failure. A View may contain files that were checked out of a ClearCase VOB, modified, but not yet checked back in when the failure occurred. This CM archive procedure uses synchronization techniques to ensure that no data is lost. The System Administrator's procedure does not include these techniques.

3. Current system and network configurations prohibit the installation of the View storage area on the developers'/ maintainers' personal workstations. As a result, Configuration Management has assumed the responsibility of backing up the View storage areas from the ClearCase server. However, once the developers/ maintainers are provided with workstations that permit the installation of a private View storage area, this responsibility will be shifted to the developer/ maintainer.

4. All ECS software is delivered electronically and via magnetic media. Copies of the exact magnetic media that were delivered are made and stored similarly to in-house generated backup tapes.

5. Backups of VOBs and Views are accumulative rather than incremental. Therefore, each tape has all data contained on previous archive tapes plus new files created, modified, etc.
6. A tape set consists of 31 archive tapes. The tapes are numbered from 1 to 31, a tape for each day of the month.
7. All software CM personnel will be familiar with the archive procedures.
8. All tape backup and archives are performed on Triton.

INSTRUCTION

1. A Software Configuration Management person will be assigned the responsibility for tape backup and archives. Daily backups are created every day at 03:30 a.m. via a UNIX cron job. Every workday morning the assigned Software CM person will perform tape archive procedures.
2. The daily backup tapes are obtained from and maintained in a fireproof safe which is kept locked. Key CM personnel hold the combination to the safe. The most current tape (the tape corresponding with the day of the month) is removed from the Triton tape drive and is always placed in the slot farthest to the left in the location marked "Current Backup". The tape corresponding to the day of the month for the next day is inserted into the tape drive.
3. On the first business day of each week the backup tape from the last business day of the previous week is given to System Administrator personnel for transportation to an off-site storage facility. Periodically the tapes stored off-site are returned to CM for reuse.
4. All tapes will be labeled with the type of data contained. In the case of delivered software, this will include, at a minimum, the title and version of the delivery, the tool used to generate the tape, and the date made.

   Example of a routine weekly backup tape label:

   Weekly Clear Case Backup Tape

   VOBs and Views

   For week ending: 01/06/94

   Tar formatted.

   Person Performing Backup:

   Example of a Deployed Software Tape:

   194-904-DV3-002

   Label: PGS TK2 Test Drivers Date: April 29, 1994

   Test_drivers.tar 2gbyte format

Command to copy file to disk: dd if=## of=file.tar
Command to untar tar file: tar xvf file.tar
where ## = your tape device and file.tar = Name you give tar file

5. During weekends and holiday periods the tape for the next workday will be placed in the tape drive on the last workday prior to the weekend/holiday. This tape will be written to on all days prior to the next workday. In this case should the system crash over the weekend/holiday period, there will be a more up-to-date backup. For example, on Friday, Monday's tape would be placed in the drive. This tape will be written to on Saturday, Sunday, and Monday due to the automated cron job. Should the system crash on Saturday after 03:30 a.m., there would be a backup from Saturday available rather than Friday. On Monday this tape would be removed and replaced with the tape for Tuesday.

6. This process does not archive personal view storage areas resident on personal development workstations (see General 3., above). Therefore, when personal development workstations are assigned, files checked out of ClearCase and under modification are not backed up. The System Administrator can back up these workstations. The user can request through the Help Desk that his development workstation be scheduled for System Administration backup. Alternately, personal backup procedures can be initiated.

7. At the time the tar file for software delivery is created, a second delivery tape will be generated in accordance with delivery procedures. This archive copy will be given to System Administrator personnel for transportation to the off-site storage facility. Incremental delivery tapes will be created, documented, and stored in accordance with this procedure. Delivery archive tapes will be stored for the life of this contract.

9.7 SW Transfer and Installation

9.7.1 Purpose

This procedure involves transferring a Sustaining Engineer Organization (SEO)-developed software maintenance change package from the SMC to a remote site (a DAAC) and later installing the ECS custom software on a selected host computer under a configuration management controlled process. The procedure begins when the SMC Configuration Management Administrator receives the software maintenance change from the SEO and directs transfer to a designated DAAC drop-off point (SEO on-site SW library). At the DAAC, the installation actions are executed by the site sustaining engineering SW Maintainer under direction from the DAAC Configuration Change Board (CCB).

9.7.2 Applicable to

All ECS sites' Sustaining Engineers, System Administrators, CM Administrators, and Maintenance Engineers.

9.7.3 References

- Software Distribution Scenario, 604-CD-002-001, 305-CD-029-001 (modified)
- COTS Software Upgrade Scenario, 604-CD-002-001, 305-CD-029-001 (adapted)
- M&O CM Plan, 102-CD-002-001
- Developed SW Maintenance Plan, 614-CD-001-002

9.7.4 Procedures

9.7.4.1 Overview

This procedure details the transfer of SW changes under CM control from the ESDIS CCB using SMC resources to distribute maintenance changes to the sites (nominally, to a DAAC). The flowcharts of figure 9.7.4-1 (transfer) and figure 9.7.4-2 (installation) detail the sequence of events involved in the delivering, testing, and installing of SW maintenance releases.

Assumptions:

- The SMC storage software will be ClearCase.
- The baseline records will be maintained in the Baseline Manager (XRP-II tool)
- The SMC transfer of software will be via tar tape or File Transfer Protocol (FTP) for Release A ; will be upgraded to Tivoli Courier (Release B)
- The transfer-storage point will be the SEO on-site SW library.
- The Software Maintenance Change package is relatively small and requires no special build/ test procedures.
- Resource Planning, Mode Management, and other issues are not addressed in this scenario.

Summary of Procedures:

- CM Process defined Changes to be incorporated by SEO into ECS Operational Baseline
- SW received at SMC from SEO CM Administrator
- Baseline changed via Baseline Manager (XRP-II tool)
- Packaged via ClearCase
- Transferred via tar tape or File Transfer Protocol (FTP) for Release A ; will be upgraded to Tivoli Courier (Release B)
- DAAC CCB Approves the Installation of SW Change Package into DAAC Operational Baseline
- SW Change Package Installed at DAAC on selected host computer

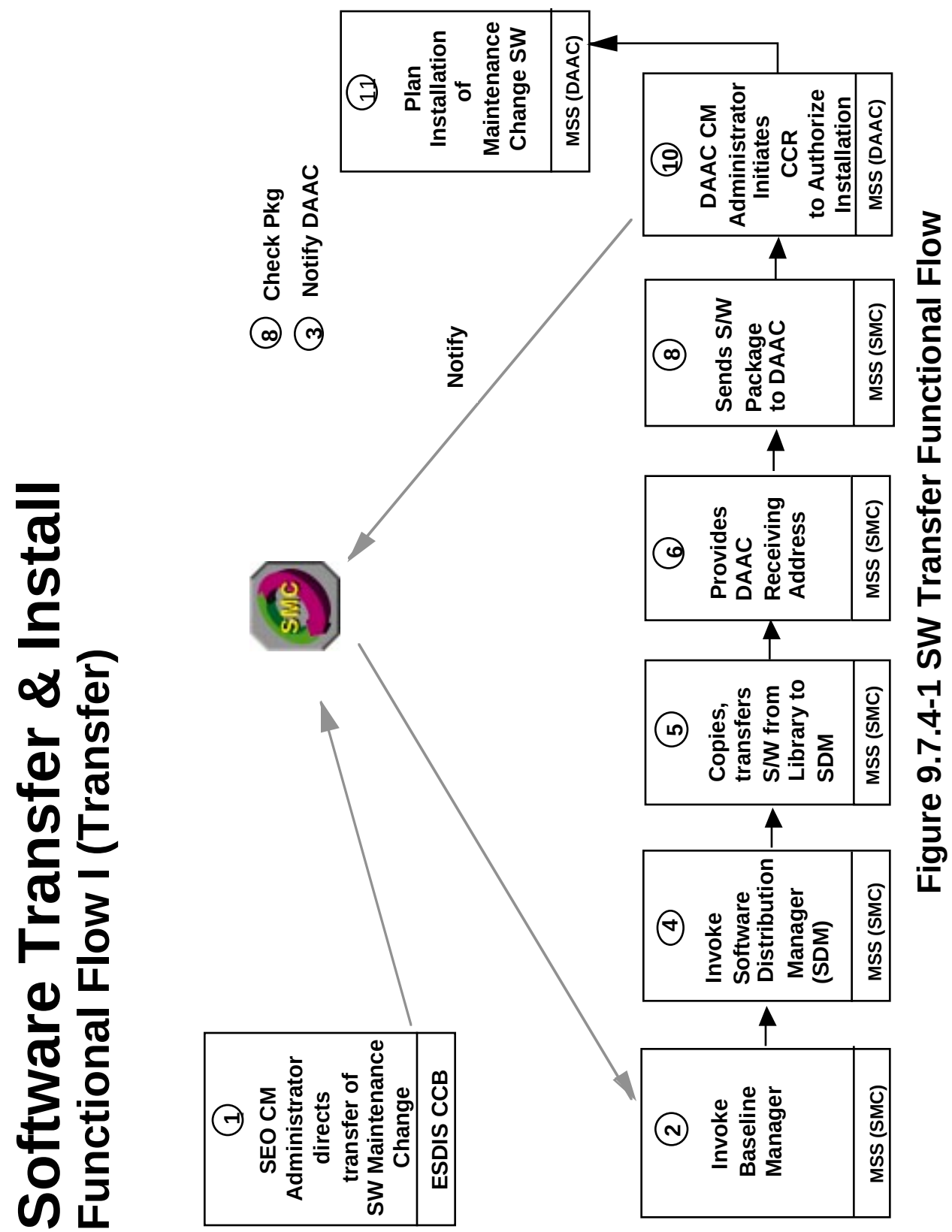

Figure 9.7.4-1 SW Transfer Functional Flow

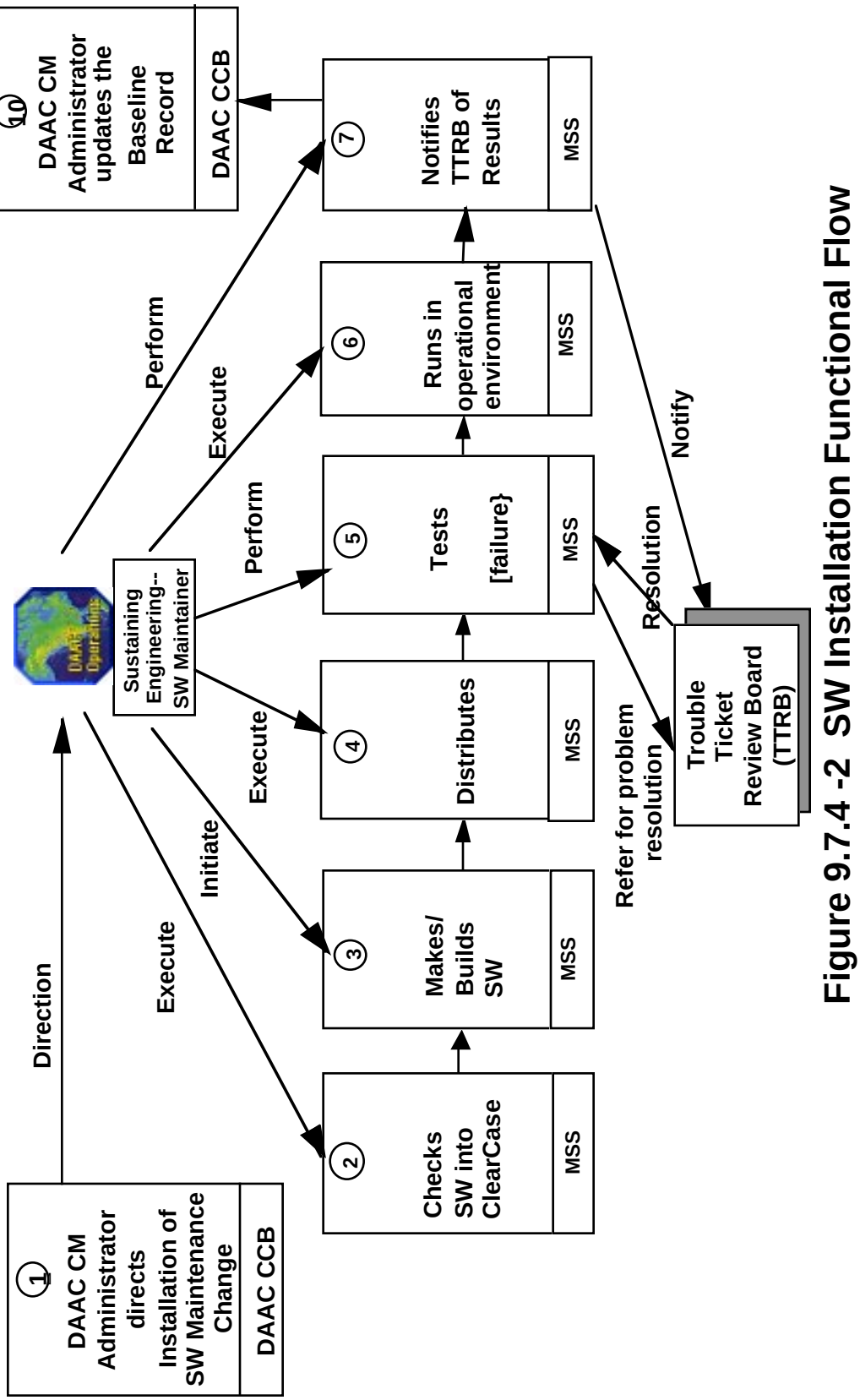

Figure 9.7.4 -2 SW Installation Functional Flow

9.7.4.2 Operator Roles

SEO CM Administrator--Ensures that changes to the hardware, software, and procedures are properly documented and coordinated. Maintains control of all configured hardware and software.

SMC CM Administrator--Provides ECS system-wide configuration management and exercise control and/or monitoring over the configurations.

DAAC CM Administrator--Ensures that changes to the hardware, software, and procedures are properly documented and coordinated. Maintains control of all configured hardware and software. Assists in the development and administration of the library with respect to configuration management procedures.

DAAC Sustaining Engineering--SW Maintainer--Produce, deliver, and document the corrections, modifications, and enhancements made to ECS software (including COTS), and/or adapt or incorporate COTS software for ECS use.

DAAC Sustaining Engineering--System Test Engineer--Develop and execute test of received software changes with the support of DAAC operators. Submit to DAAC Resource Planner for installation scheduling.

9.7.4.3 Detailed Procedures

The following figures are a three part Point of View chart that steps through all the procedure and showing how all relevant roles interact.

Software Transfer & Install
Points of View I (Transfer)

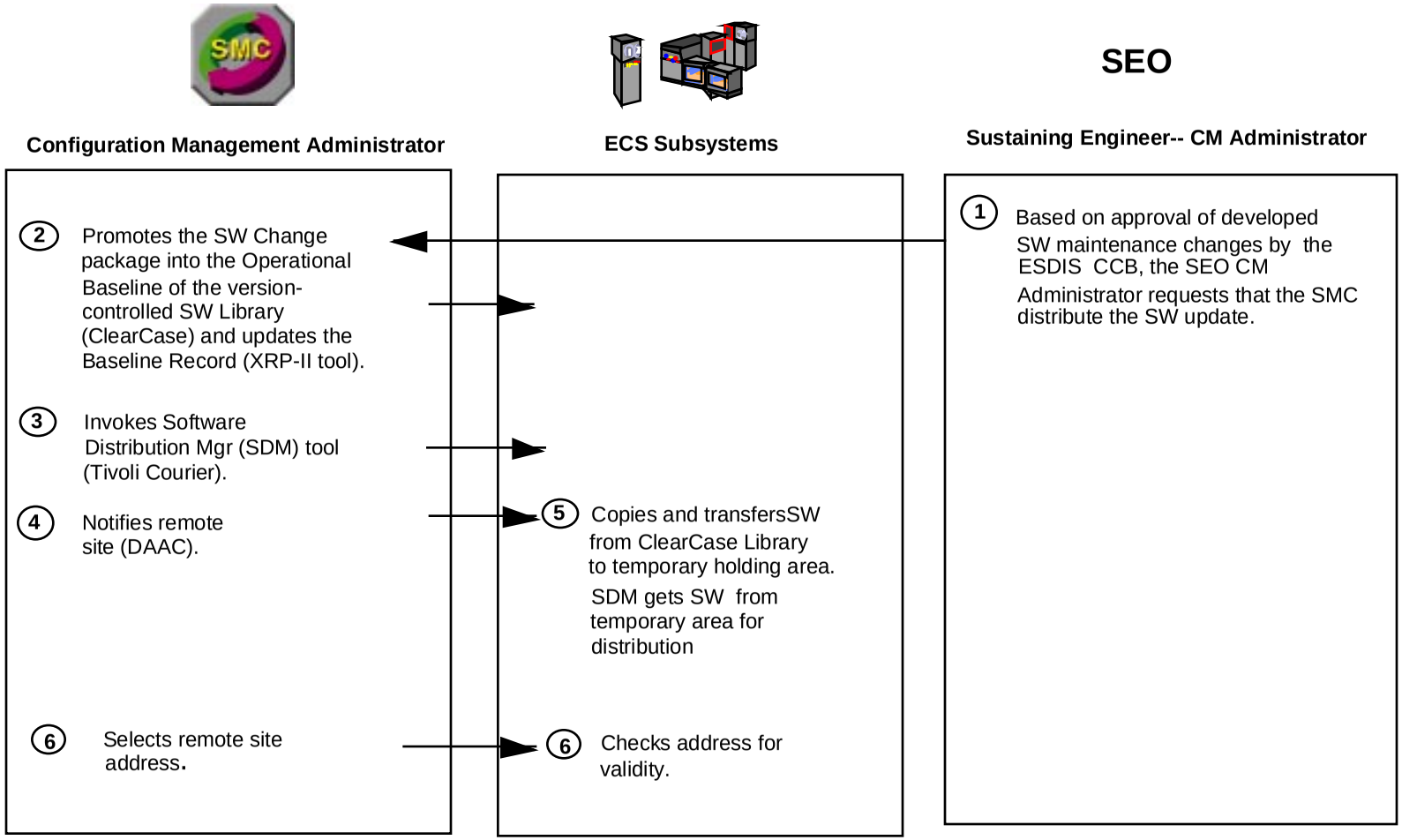

Figure 9.7.4 -3 Detailed Points of View

Software Transfer & Install
Points of View II (Transfer)

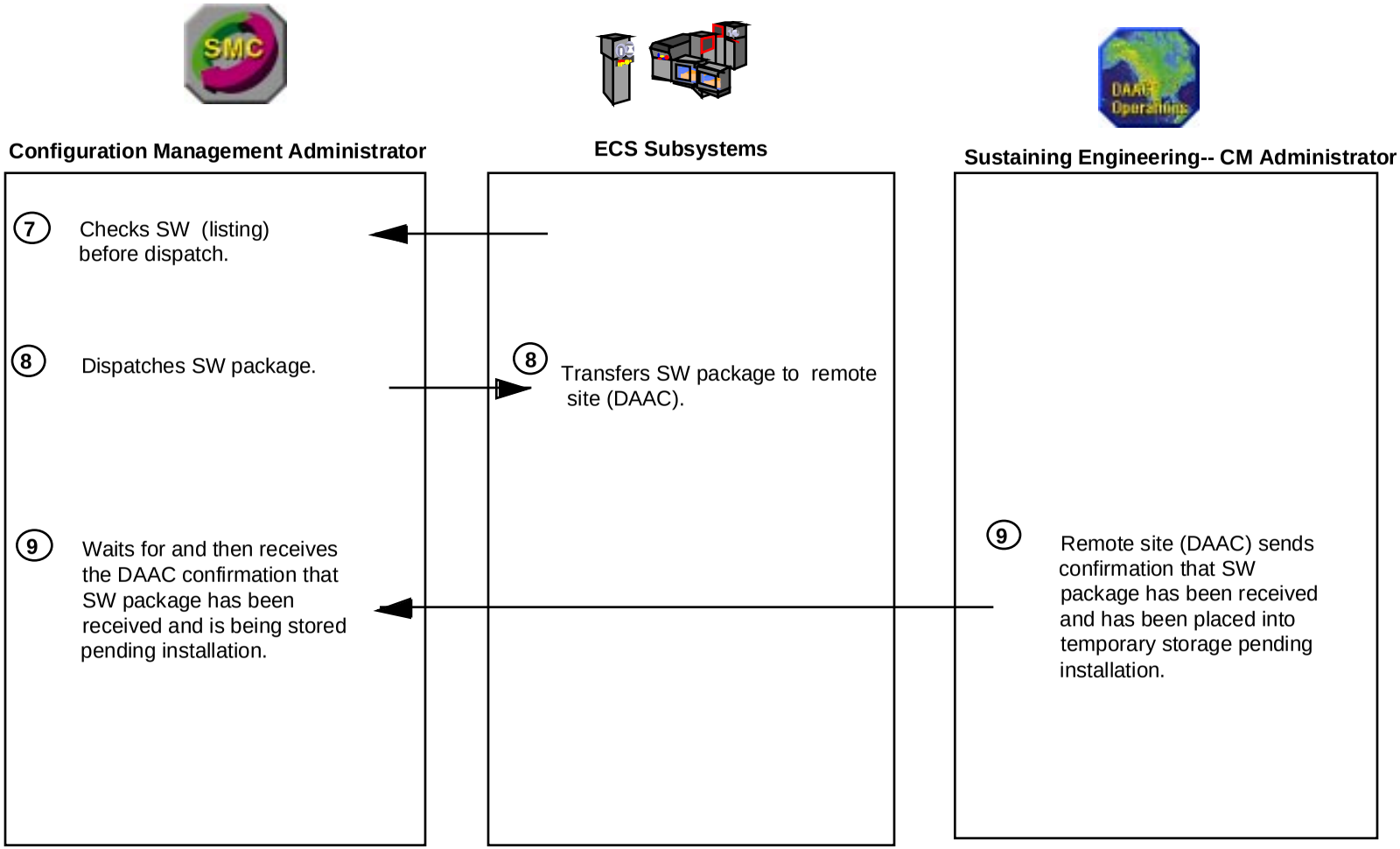

Figure 9.7.4 -4 Detailed Points of View

Software Transfer & Install
Points of View III (Install)

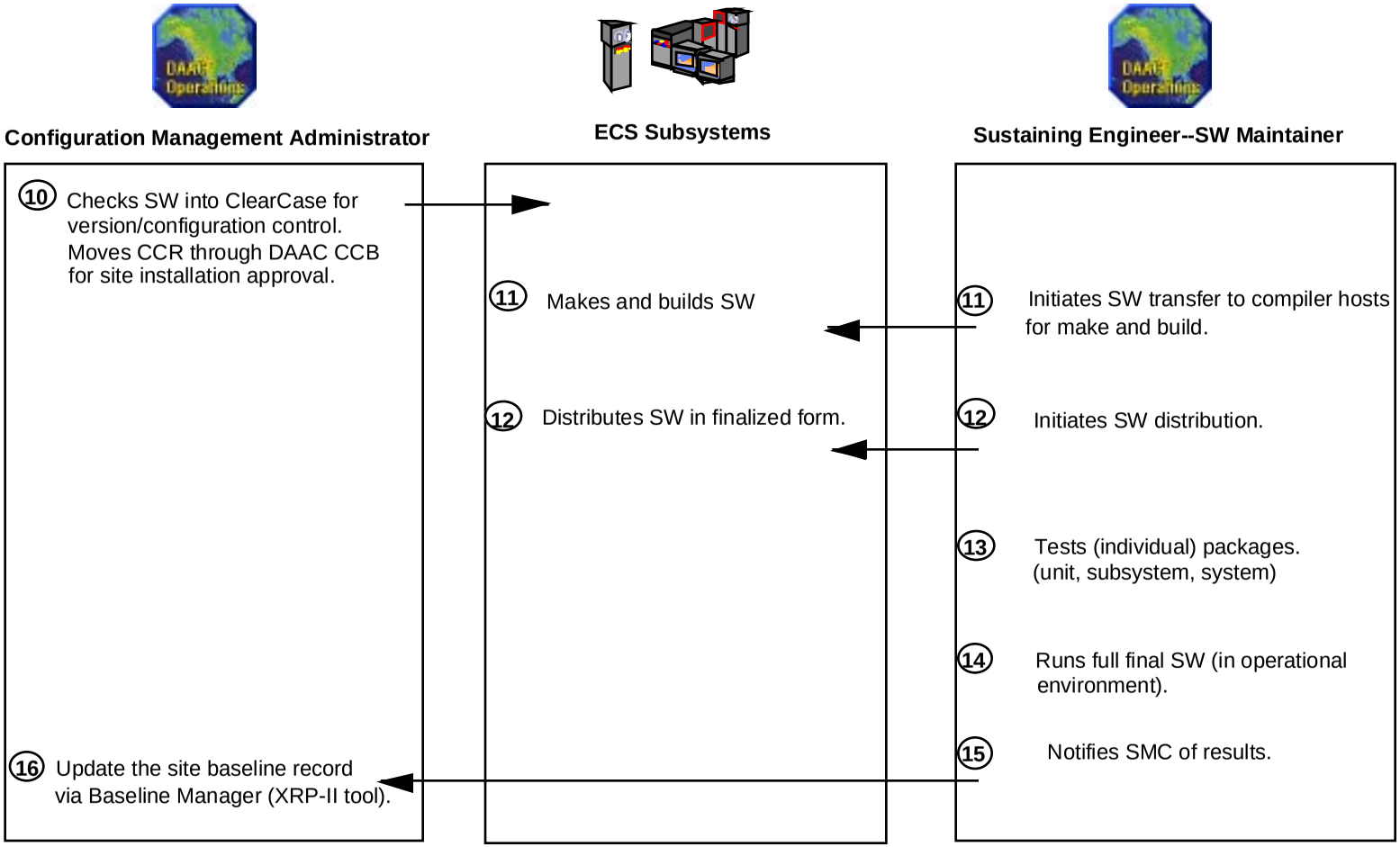

Figure 9.7.4 -5 Detailed Points of View

9.7.4.4 Data Activity

The following four tables, 9.7.4-1 through 9.7.4-4, describe data activities associated with the SW transfer and installation workflows of figures 9.7.4-1 and 9.7.4-2A for SMC Configuration Management Administrator's data maintenance activities and 9.7.4 B&C for site-level (DAAC) configuration management data maintenance by the SEO Maintence Engineer and CM Administrator.

Table 9.7.4-1 Data Activity for Workflow at the SMC

SMC Configuration Management Administrator Role	Data Element	Operator Interactions (Edit, Input, Display)
1. Invoke Software Distribution Manager (SDM) and use the tar file procedures or FTP (Release A) or Tivoli (Release B upgrade) - for bundling and transferring package parts.	Package ID Package Name SW Upgrade Name Version Description File Structure Type	Input/Edit Input/Edit Input/Edit Edit Edit Edit Input/Edit
2. Select remote site address (DAAC).	Destination	Input/Edit
3. Check, dispatch S/W package.	Destination	Edit

Table 9.7.4-2A Data Activity for Workflow at the DAAC

DAAC CM Administrator	Data Element (Object Attribute)	Operator Interactions (Edit, Input, Display)
1. Receives message of SW ready for site installation	E-Mail (send/receive)	Display
2. Processes CCR for DAAC Installation of Software Upgrade using developer's install script stored in ClearCase.	DDTS: DAAC CCR # SW Package ID Package Name SW Upgrade Name Version Description File Structure Type Installation Schedule	Input/Edit

Table 9.7.4-2B Data Activity for Workflow at the DAAC

DAAC Sustaining Engineer SW Maintainer	Data Element (Object Attribute)	Operator Interactions (Edit, Input, Display)
3. Installs SW Upgrade using the developer's installation script stored in ClearCase	**Package ID Package Name SW Upgrade Name Version Description File Structure Type**	**Input/Edit**
4. Verifies that all of the paths and directory structures have been created and are correct.	**ClearCase: Description File Structure Type**	**Input/Edit**
5. Runs all diagnostic tests to verify that the new upgrade is operating as expected.	**ClearCase: Description File Structure Type**	**Input/Edit**
6. Informs the Resource Manager that the upgrade is completed.	**E-Mail (send/receive)**	**Input/Edit**

Table 9.7.4-2C Data Activity for Workflow at the DAAC

DAAC CM Administrator	Data Element (Object Attribute)	Operator Interactions (Edit, Input, Display)
7. Update the Baseline Record	**XRP-II:** **DAAC CCR #** **SW Package ID** **Package Name** **SW Upgrade Name** **Version** **File Structure** **Type** **Installation Date**	**Input/Edit**

9.8 Change Request Manager

The commercial off-the-shelf (COTS) product, Distributed Defect Tracking System (DDTS), serves as the Change Request Manager (CRM). DDTS provides the functionality necessary to compose, submit, report, and track status of changes proposed for ECS resources. It provides the M&O staff at the sites and the SMC the capability to register Configuration Change Requests (CCRs). DDTS prompts for relevant information, assigns an identifier, and mails notification of the newly submitted requests to pre-designated personnel. As the CCRs advance through approval and implementation processes, DDTS maintains status, disposition, resolution, and closure information as entered by the M&O staff. It sends notification to pre-designated personnel when the status of the CCR record changes and makes data available for viewing by authorized staff members.

The Activity Checklist table that follows provides an overview of Change Request Manager capabilities. Although Column one (**Order**) shows the order in which tasks might be accomplished, please note that they are independent of each other and can be performed in any order, as necessary. Column two (**Role**) lists the site/organization Configuration Management Administrator (CMA) responsible for performing the task. Column three (**Task**) provides a brief explanation of the task. Column four (**Section**) provides the Procedure (P) section number or Instruction (I) section number where details for performing the task can be found.

Change Request Manager - Activity List

Order	Role	Task	When and Why to Use	Section
1	CMA	View CCR	Operator uses this function whenever he/she wants to quickly view the contents of CCRs in the Index.	(P) 9.8.3
2	CMA	Submit CCR	Operator uses this function whenever there is a new CCR to be entered into the DDTS database.	(P) 9.8.4
3	CMA	Change Status of CCR	Operator uses this function whenever the activities of a particular state have been completed and its time to move to the next state.	(P) 9.8.5
4	CMA	Modify CCR	Operator uses this function to change previously entered data and/or to enter data into fields previously left blank.	(P) 9.8.6
5	CMA	Print CCR	Operator uses this function to obtain a hard or soft copy of a CCR	(P) 9.8.7

			or all of the CCRs in the CCR index.	
6	CMA	Generate Reports	Preformatted reports will be generated for each CCB.	(I) 9.8.9

NOTE: All changes made to the CCR record are monitored by the system and logged in the History enclosure. To view this log, click on the History icon on the DDTS main screen (PureDDTS).

9.8.1 Configuration Change Request (CCR)

The CCR form has been developed as a medium for processing CCRs throughout the ECS Maintenance and Operations environment for changes processed by the ESDIS CCB and its ECS site-level chartered CCBs at the SMC, EOC, and DAACs (GSFC, LaRC, ASF, EDC, JPL, NSIDC, and ORNL). The information included on the CCR is described below. Copies of the CCR, CCR Impact Analysis Form, and CCR Impact Summary form are provided in Section 9.2. Each CCB will have unique CCR identification sequence numbers. Each CCB can forward CCRs and reports from the Change Request Manager to SMC, where SEO processes system-level CCRs for ESDIS CCB. The ESDIS CM Plan will determine the charter of the respective CCBs and thus the scope of CCR issues to be addressed by the site CCBs.

Sections 9.8.4 defines the procedures to enter data from the hardcopy CCR into the Change Request Manager.

Many of the numbered items on the form correspond to the data entry required for CCRs maintained in the Change Request Manager. [Where the hardcopy CCR information is entered in the Change Request Manager tool is defined by referencing appropriate tables found in the subsections that follow.] The Configuration Management Administrator oversees maintenance of the CCR records in the Change Request Manager for his or her respective CCB.

1. **Configuration Control Board (CCB) —** The designated CCB is checked-off for changes processed by the ESDIS CCB and its ECS site-level chartered CCBs at the SMC, DAACs (GSFC, LaRC, ASF, EDC, JPL, NSIDC, and ORNL), and EOC. [This information is not entered into the Change Request Manager.]

2. **CCR Number —** The unique serialized CCR number is applied at each site. This number is system-generated. [Submit record field; see Table 9.8.4-1.]

3. **Submitted Date —** The date that the CCR was prepared is documented. [Submit record field; see Table 9.8.4-1.]

4. **Revision —** The current revision is designated for tracking changed versions of the original CCR. The Revision number is assigned by the Configuration Management Administrator or by the originator of the CCR with approval of the Configuration Management Administrator. [Submit record field; see Table 9.8.4-1.]

5. **Priority —** The priority level of the CCR is assigned by the CCB. Emergency CCRs may have already been implemented on a temporary basis by the Trouble Ticket Review

Board (TTRB) with concurrence from the CCB Chair who later receives the CCR to document/implement the permanent change. Urgent items will be reviewed by the next CCB meeting. Routine items will be reviewed as soon as the schedule permits. [Submit record field; see Table 9.8.4-1.]

6. **Change Class —** Change Classes are either I or II. Class I will be handled by ESDIS-only because of cost, schedule, and/or mission impacts that may require requirements changes. Class II items do not affect mission requirements but may have cost and/or schedule implications which affect maintenance, operations, procedures, documentation, site-tailored items, COTS implementation, site installations of core system changes, science SW changes, etc. [Submit record field; see Table 9.8.4-1.]

7. **Status —** Status of the CCR is updated in the Change Request Manager until closed by the CCB. Note that the hard copy form will not be updated but will be kept in the master suspense file of the CM Administrator until closed-out with a stamp (Item 15, below) and appropriate signatures (see Items 16 and 17, below). [Submit record field; see Table 9.8.4-1.]

   Eleven valid status indicators (states) are listed below. The corresponding Change Request Manager State Code (upper-case single character) is provided in parentheses after the status descriptive name. This code is stored in the change request record. The Change Request Manager uses this value to search and extract the descriptive name to display in reports. The descriptive names, for example, Assign-Eval, are as they appear in the Change Request Manager for selection during input. Some query and report codes use the descriptive name rather than the single letter code to facilitate querying. Following the definition is the status as it appears on the CRR. These status indicators appear in the Change_State Menu, described in Section 9.8.5, below.

   Submitted (S) — not used on CCR hardcopy but is system-generated when CCR is input to the Change Request Manager prior to a CCB decision. (Submitted)

   New (N) — the initial state for all newly entered change requests. (New)

   Assign-Eval (A) — state entered when the change request is being assigned to an engineer for evaluation/analysis. (Assigned-Eval)

   Assign-Implement (O) — state entered when the change request is being assigned to an engineer for development. (Assigned-Implement)

   Implement (R) — state entered when the proposed change has been developed. (Implemented)

   Assign-Verify (T) — state entered when the developed change is being assigned to an engineer for verification testing. (Assigned-Verify)

   Verify (V) — state entered when a developed change has been tested and verified that it functions properly. (Verified)

Close (C) — state entered when all activity specified in the change request has been completed or that the approval authority has decided to close it prior to completion of all activity. Referred to as Close-out stamp. (Closed)

Duplicate (D) — state entered when a change request is determined to be a duplicate of an existing change request. Duplicate change request identifies change request being duplicated. (Duplicate)

Defer (P) — state entered when activity on a change proposal has to be postponed. (Deferred)

Forward (F) — state entered when a change request needs to be forwarded to another DDTS-defined project. In DDTS terminology, a project is a grouping of change requests. For example, a change request from a site project can be forwarded to an ECS project. (Forwarded)

8. **CCR Title —** The CCR title is supplied by the originator. [Submit record field; see Table 9.8.4-1.]

9. **Originator —** The originator name, organization, e-mail address, and phone number is given. [Submit record fields; e-mail address not included; see Table 9.8.4-1.]

10. **Approval —** The CCR is approved by the designated management authority which is assigned by the CCB. This sponsorship requirement acts as a primary filter to eliminate from consideration those CCRs that cannot be implemented or which have no ECS site management support. [Assign-Implement field; see Table 9.8.5-2.]

11. **Reason for Change —** The reason for the change is narrated on the form and/or the designated attachment. [This information may be included in the Proposed Change Enclosure; see Section 9.8.4-1, Step 2.]

12. **Description of Change —** The proposed implementation of the change is narrated along with any known impacts, resources, and expenses to be incurred. [This information may be included in the Impact Summary Enclosure; see Section 9.8.5.1, Step 2.]

13. **Impact Analysis —** Impact analysis is documented in the CCR Impact Analysis form. The impact analysis is collected by the CCB Chair appointed Evaluation Engineer in coordination with the CM Administrator who maintains the CM records and assembles the review package for the CCB. The Evaluation Engineer documents the list of Impact Evaluators and derives and/ or verifies cost, technical, and schedule impact of the proposed change based on all inputs received. The results of the coordinated CCR Impact Analysis inputs are presented in the CCR Impact Summary form as part of the CCR review package. [This information may be included in the Impact Summary Enclosure; see Section 9.8.5.1, Step 2.]

14. **Comments —** Comments are added to the CCR to summarize sites and/or organizations affected by the CCR. Additional comments may address proposed CCB dispositions and recommendations to be indicated by resolutions in Item 15, below.

[This information may be included in the Resolution Enclosure; see Section 9.8.5.2, Step 2.]

15. **Board Action —** CCB actions and follow-up actions that will be facilitated and tracked by the CM Administrator are indicated. [Assign-Implement field; see Table 9.8.5-2. Also may be applicable to Resolution Enclosure; see Section 9.8.5.2, Step 2.] Possible CCB dispositions are given as approved, withdrawn, disapproved, and deferred (pending follow-up activities by the indicated schedule date). Further actions are indicated as:

    Engineering Change Proposal (ECP) — changed scope of contract requirements.

    Waiver — declaration that certain contract requirements no longer apply.

    Deviation — change of contract terms or substitution of terms or deliverable requirements.

    Technical Direction — order by Contracting Officer's Technical Representative (COTR) to perform certain tasks within the scope of the contract.

    Contract Modification — changes to the terms of a contract.

    Document Change Notice (DCN) — notification of changes to published documents.

    Others — Engineering Change Notice, Change Order, Escalation to higher CCB authority, etc.

16. **CCB Approval —** CCB approval signature authority by CCB Chair or designate. [Assign-Implement field; see Table 9.8.5-2.]

17. **CCR Implemented —** This signature and close-out stamp (Item 7, above) are executed by the CM Administrator witnessing the completion of the CCR implementation process, which is tracked in the Change Request Manager automated tool and updated in Baseline Manager (XRP-II) for affected version control status changes. [Assign-Implement field; see Table 9.8.5-2.]

Sections 9.8.3 through 9.8.7 define procedures to process a CCR using the Distributed Defect Tracking System (DDTS) application software database tool that implements the Change Request Manager. The procedures, though step-by-step, are not detailed for the novice user. Please refer to the PureDDTS User's Manual whenever further explanation may be required. Relevant sections of the Manual are identified where applicable.

9.8.2 Accessing Change Request Manager

Depending on your site configuration, access to the Change Request Manager, DDTS, will be by clicking an icon from your desktop, or by typing the following at the command line prompt:

> **xddts**

The PureDDTS screen is the main screen. It consists of three major areas:

• the CCR Index Display which shows a listing of CCRs;

• the CCR Record page, which displays some of the content of the highlighted CCR in the Index; and

• the Enclosure Display, which shows the initial set of enclosure icons available for CCR update.

From this screen, you initiate all DDTS functions: View CCR, Submit CCR, Change state of CCR, Modify CCR, Print CCR. Reference Chapter 3 of the PureDDTS User's Manual for information concerning the menus and buttons on the DDTS Main Screen.

9.8.3 View a CCR

Entering DDTS brings you to the main screen (PureDDTS). To view any CCR listed in the CCR Index, simply highlight the desired CCR. The CCR is accessed.

9.8.4 Submit a CCR

Clicking the Submit button on the main screen (PureDDTS) will bring up the "Submit A New Change Request" screen. This screen enables the operator to select a class of projects (the Change Request Class is the default class) and a specific project (group of CCRs within the selected class) to which he/she wants to add a CCR. Reference Chapter 2 of the PureDDTS User's Manual for a detailed explanation of the terms, class and project.

As stated above, the selection for class of projects is defaulted for CCR processing, so you won't need to change it:

Submit to which class of projects: Change_Request

To select Project name, either type in your selection or type a question mark as shown:

Project name: ?

A drop-down menu will appear from which to make your selection. (The Configuration Management Administrator can add a project to the list. See the PureDDTS Administrator Manual.)

Click on **Help** to get an explanation for each of the fields shown, how to move within a screen, and how to terminate the submit process.

Once the Configuration Management Administrator enters the desired class of projects and project name, the CCR page displays the CCR record form. This form enables the operator to enter detailed information concerning the proposed change request. Descriptions of the Submit Record fields are listed in Table 9.8.4-1. Table 9.8.4-2 presents the steps performed using DDTS to submit CCRs. It summarizes the procedures as a quick reference. If you are already familiar with the procedures, you may refer to this table. If you are new to the system or have not performed this task recently, please refer to the more detailed steps provided in this section.

Table 9.8.4-1 Submit Record Field Descriptions

Field Name	Data Type	Size	Entry	Description
CCR Number	character	10	System generated	a unique identifier for this resource change request
Submitted	date	6	System generated	the date this proposed change was first registered
Revision	character	2	Optional	the current revision/amendment to the proposed change
Priority	character	9	Required	the urgency with which a proposed change is needed. Answer must be one of the following: routine, urgent, emergency. The default is routine
Change Class	character	2	Required	the classification that distinguishes change requests according to management level needed for approval. Answer must be I or II. The default is II.
Status	character	17	System generated	the stage this proposed change has reached in its life cycle
Title	character	72	Required	the nomenclature used to identify the proposed change
Originator Name	character	25	Required	name of the person who is the author of the proposed change
Organization	character	30	Required	name of the originator's organization
Phone Number	character	13	Required	phone number where originator can be reached
Organization Evaluation Engineer	character	25	Required	name of the person who initially determines whether or not the proposal has merit and should be entered into the DDTS database
CM Admin. Name	character	8	System generated	name of the individual who registered this proposed change/enters the proposed change into the DDTS database. Note, DDTS uses User's Login ID
Organization	character	5	Required	name of the CM administrator's organization. Answer must be one of the following: ASF, EDC, EOC, GSFC, JPL, LaRC, NSIDC, ORNL, SMC
Phone Number	character	13	Optional	phone number of the CM Administrator

1 Access DDTS by clicking on the DDTS icon from your desktop, or by typing the following command on the command line: **xddts**

2 Enter data in the Submit Record fields.

3 Display the Proposed Change Enclosure Screen by traversing all of the CCR record fields or by clicking on the Proposed Change icon. This enclosure is used to hold additional information about a proposed change. It enables the operator to enter a free text description of the perceived need or problem and a proposed solution. For more information on the enclosure screen see Chapter 3 (Enclosures Section) of the PureDDTS User's Manual.

4 Click the File menu on the enclosure screen and select its "save as" option to save the contents of the enclosure. You will be brought back to the main screen (PureDDTS).

5 When the main screen display reappears, click the "Commit" button to store the CCR record into the DDTS database.

Table 9.8.4-2 Submit a CCR - Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1	PureDDTS Main Screen. Click on Submit button.	Initiate the CCR record submission process.
2	Enter data in fields and Proposed Change enclosure.	Enter data in Record screen.
3	Click on Commit button.	Store record into DDTS database.

9.8.5 Change State of CCR

The first status (state) assigned to a CCR after it is committed to the DDTS database is "New." Refer to the upper left corner of the center section of screen for the current status of the CCR. When it is time to move the CCR to its next life cycle state, the Change_State Menu on the main screen is used. See Number 7, Status, in Section 9.8.1, above. Table 9.8.5 presents the steps performed using DDTS to change the state of a CCR. It summarizes the procedures as a quick reference. If you are already familiar with the procedures, you may refer to this table. If you are new to the system or have not performed this task recently, please refer to the more detailed steps provided below and to Sections 9.8.5.1 through 9.8.5.5.

1 Access DDTS by clicking on the DDTS icon from your desktop, or by typing the following command on the command line: **xddts**

2 Click on the Change_State Menu to access the available state options available for the CCR record.

3 Select the next state to be assigned. After the next state is selected, the associated data fields (if any) for this new state are accessed.

4 Enter data into the associated data fields for the state, as indicated on the screen. These vary according to state being entered. For descriptions of these states, see Sections 9.8.5.1 through 9.8.5.5: Assign-Eval, Assign-Implement, Assign-Verify, Verify, Close. For the

states Duplicate, Defer, and Forward, refer to the DDTS User's Manual (also Section 9.8.1, above).

Table 9.8-5 Change State of a CCR - Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1	PureDDTS Main Screen. Click on Change_State menu.	Select State.
2	Enter data in fields	Enter data in applicable record screen.
3	Click on applicable Enclosure icon.	Enter data.
4	Click on Commit button.	Store record into DDTS database.

9.8.5.1 Assign-Eval State

The Assign-Eval state indicates that the change request is being assigned to an engineer for evaluation/analysis. Table 9.8.5-1 lists the fields for which values are entered.

Table 9.8.5-1 Assign-Eval Field Descriptions

Field Name	Data Type	Size	Entry	Description
Evaluation Engineer	character	8	Required	name of the responsible engineer designated to analyze the proposed system change. Use Login user name of the engineer
Organization	character	5	Required	name of the evaluation engineer's organization. Answer must be one of the following: SEO, GSFC, LaRC, ASF, EDC, JPL, NSIDC, ORNL, SMC, EOS
Eval. Engr. Email Address	character	25	Optional	electronic mail address of the evaluation engineer
Impact Evaluators (evaluators 1 -12)	character	5	Optional	collection of names of organizations designated to assess the impact of this proposed change. Answer (s) must be from the following: SEO, ESDIS, GSFC, LaRC, ASF, EDC, JPL, NSIDC, ORNL, SMC, EOC, EDF
Sites Affected (sites 1-9)	character	5	Optional	the collection of names of ECS sites affected by this proposed changes. Answer (s) must be from the following: SMC, GSFC, LaRC, ASF, EDC, JPL, NSIDC, ORNL, EOC

Related CCR#	character	10	Optional	the number of another CCR that is related to/associated with this CCR
CI Affected	character	15	Optional	the identifier of the principal configuration item affected by this proposed system change
Docs. Affected	character	56	Optional	the documents identifiers of the system documents affected by the proposed system change
Release Affected	character	10	Optional	the ECS release in which the proposed change is targeted for implementation
Baselines Affected	character	56	Optional	the identifiers of system baselines affected by the proposed change

1 Enter data in the Assign-Eval fields.

2 Display the Impact Summary Enclosure Screen by traversing all of the Assign-Eval record fields or clicking on the Summary Enclosure icon. This enclosure is used to hold free text information concerning the impact of the proposed change based on inputs received from the evaluators.

3 Click the File menu on the enclosure screen and select its "save as" option to save the contents of the enclosure. You will be brought back to the main screen (PureDDTS).

4 When the main screen display reappears, click the "Commit" button to store the next state data into the DDTS database.

5 The selected state, "Assigned-Eval," is now shown as the current state (Status) of the CCR record.

9.8.5.2 Assign-Implement State

The Assign-Implement state indicates when the change request is being assigned to an engineer for development. Table 9.8.5-2 lists the fields for which values are entered.

Table 9.8.5-2 Assign-Implement Field Descriptions

Field Name	Data Type	Size	Entry	Description
Disposition	character	14	Required	the final decision made by a designated approval official concerning this proposed change. Answer must be one of the following: Approved, Approved_w/cmt, Disapproved, Withdrawn, Deferred
CCB Approval Official	character	25	Required	name of the individual whose decision is reflected in the proposed change's disposition

Field Name	Data Type	Size	Entry	Description
CCB Approval Date	date	6	Required	the date the final decision was made concerning this proposed change. Required format is yymmdd
CCB Org.	character	5	Required	the name of the organization whose configuration control board have authority to approve the change request. Answer must be one of the following: ESDIS, SMC, GSFC, LaRC, ASF, EDC, JPL, NSIDC, ORNL
Implementation Organization	character	5	Required	name of the organization assigned to implement this proposed change. Answer must be one of the following: SEO, GSFC, LaRC, ASF, EDC, JPL, NSIDC, ORNL
Implement. Engineer	character	8	Required	name of the responsible engineer designated to implement the proposed system change. Use Login user name of the engineer
E-mail Address	character	20	Optional	electronic mail address of the implementing engineer
Start Date-	date	6	Required	date implementation activity is to begin. Required format is yymmdd
Estimated Time to Complete	character	20	Optional	estimated time it will take to develop and unit test proposed change in days or months
Completion-Date	date	6	Optional	the date that the proposed change was completed. Required format is yymmdd
Effective Date-	date	6	Optional	the date that the proposed change is go into operation. Required format is yymmdd

1 Enter data in the Assign-Implement fields.

2 Display the Resolution Enclosure Screen by traversing all of the Assign-Implement record fields or by clicking on the Resolution Enclosure icon. This enclosure is used to hold free text description of the solution for the proposed change request.

3 Click the File menu on the enclosure screen and select its “save as” option to save the contents of the enclosure. You will be brought back to the main screen (PureDDTS).

4 When the main screen display reappears, click the “Commit” button to store the Assign-Implement state’s data into the DDTS database.

5 The Implement state (state entered when the proposed change has been developed) is the state that follows Assign-Implement on the Change_State Menu. No data fields are

associated with the Implement state. When Implement is selected, the status is simply changed to Implemented.

9.8.5.3 Assign-Verify State

The Assign-Verify state indicates that the developed change is being assigned to an engineer for verification testing. Data fields appear under the heading, "TESTING INFORMATION" on the Record screen. Table 9.8.5-3 identifies these fields.

Table 9.8.5-3 Assign-Verify Field Descriptions

Field Name	Data Type	Size	Entry	Description
Test. Engr. Name	Character	25	Required	Name of the engineer designated to test the system change
Test Org.	character	5	Required	name of the test engineer's organization. Answer must be one of the following: ASF, EDC, EOC, GSFC, JPL, LaRC, NSIDC, ORNL, SMC
Est. Testing Completion Date	date	6	Optional	the date that the tester expects to have completed his testing activity. Required format is yymmdd

1 Enter data in the Assign-Verify fields.

2 After you have completed your input, the system may automatically bring you back to the main screen (Pure DDTS) or click on **Prev**.

3 When the main screen display reappears, click the "Commit" button to store the Assign-Verify state's data into the DDTS database.

9.8.5.4 Verify State

The Verify state indicates that a developed change has been tested and verified that it functions properly. The data fields appear under the heading, "VERIFICATION INFORMATION" on the Record screen. Table 9.8.5-4 identifies these fields.

Table 9.8.5-4 Verify State Field Descriptions

Field Name	Data Type	Size	Entry	Description
Test Status	character	1	Required	this is an indicator as to whether or not the item (s) being tested has passed the test. Answer must be Passed or Failed
Enclosure Added	character	1	Required	this is an indicator as to whether or not an enclosure has been to further describe the testing activity. Answer must be Yes or No

1 Enter data in the Verify fields.

2 After you have completed your input, the system may automatically bring you back to the main screen (Pure DDTS) or click on **Prev**.

3 When the main screen display reappears, click the "Commit" button to store the Verify state's data into the DDTS database.

9.8.5.5 Close State

The Close state indicates that all activity specified in the change request has been completed or that the approval authority has decided to close it prior to completion of all activity. Data fields appear under the heading, " CLOSING INFORMATION" on the Record screen. Table 9.8.5-5 identifies these fields.

Table 9.8.5-5 Close State Field Descriptions

Field Name	Data Type	Size	Entry	Description
Closed By	character	25	Required	name of the individual that is closing the CCR
Closing Date	date	6	Required	date that the CCR is closed. Required format is yymmdd
Closer's Organization-	character	5	Required	name of the closing official's organization. Answer must be one of the following: ASF, EDC, EOC, GSFC, JPL, LaRC, NSIDC, ORNL, SMC

1 Enter data in the Close fields.

2 After you have completed your input, the system may automatically bring you back to the main screen (Pure DDTS) or click on **Prev**.

3 When the main screen display reappears, click the "Commit" button to store the Close state's data into the DDTS database.

9.8.6 Modify CCR

There will be times when the operator needs to change the information that was entered previously into the database or to enter information into fields that were not completed initially. The Modify Menu enables modification of database data. Table 9.8.6 presents the steps performed using DDTS to modify a CCR. It summarizes the procedures as a quick reference. If you are already familiar with the procedures, you may refer to this table. If you are new to the system or have not performed this task recently, please refer to the more detailed steps provided below:

1 Access DDTS by clicking on the DDTS icon from your desktop, or by typing the following command on the command line: **xddts**

2 From the Main Menu (PureDDTS) select the CCR you want to modify.

3 Click the "Modify" menu on the main screen Record to bring up the modify options.

4 Select the "Modify Record" option to change existing information and/or to enter information into fields left blank previously.

5 The cursor appears at the first field that may be modified. The modify record mode enables the operator to go through all of the fields that are associated with the current status of the CCR and make changes where appropriate.

6 Once the changes have been made, return to the main screen (Pure DDTS) and click the Commit" button on the main screen to add the changes to the database.

7 Reference Chapter 3, "Modify Menu and the Enclosure Sections," of the PureDDTS User's Manual for additional information as necessary.

Table 9.8.6 Modify a CCR - Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1	From Record screen, click on Modify menu.	Select option.
2	Enter data in fields	Modify record and/or enclosure.
3	Click on Commit button.	Store record into DDTS database.

9.8.7 Print CCR

The DDTS Print option allows the operator to display a CCR or several CCRs in the CCR index in a selected format on his or her monitor; print a CCR or several CCRs in the CCR index to a printer; or print a CCR or several CCRs in the CCR index to a designated file. Table 9.8.7 presents the steps performed using DDTS to print CCRs. It summarizes the procedures as a quick reference. If you are already familiar with the procedures, you may refer to this table. If you are new to the system or have not performed this task recently, please refer to the more detailed steps provided below:

1 Access DDTS by clicking on the DDTS icon from your desktop, or by typing the following command on the command line: **xddts**

2 From the main screen (Pure DDTS), select CCR or CCRs to be printed.

3 Click on the Options Menu then select **Print**, or click on the "Print" button, to bring up the Printing Options Screen. This screen provides the operator the capability to print a highlighted CCR or all of the CCRs in the index on the main screen in a full page, index, one-line, or three-line format.

4 Select the desired option under "Where to Print" and provide appropriate information for printer and file options. Refer to Chapter 3, "Setting PureDDTS Options," of the PureDDTS User's Manual for additional details about the Printing Options screen.

Table 9.8.7 Print a CCR - Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1	PureDDTS Main Screen. Click on Print button.	Select options.
2	From Format to Print screen, click on Print button..	Store record into DDTS database.

9.8.8 Required Operating Environment

9.8.8.1 Interfaces and Data Types

The DDTS application will interface only with the ClearCase application at each of the sites. This DDTS/ClearCase interface is facilitated by a ClearCase/DDTS Integration COTS package. DDTS has no interfaces external to the ECS.

9.8.8.2 Databases

The PureDDTS database is a proprietary database that supports the SQL 89 standard. Reference Appendixes F and G of the PureDDTS Administrator's Manual for details about the PureDDTS database.

9.8.8.3 Database Schema

Reference Appendix F of the PureDDTS Administrator's Manual for a description of DDTS' database schema.

9.8.8.4 Database Parameters

Reference Appendixes F and G of the PureDDTS Administrator's Manual for DDTS' database parameters.

9.8.8.5 Command Line Interface

DDTS interfaces with ClearCase only. This interface is facilitated through a ClearCase/DDTS Integration COTS package. No custom command line interface has been developed. This interface supports a verification query by ClearCase for authorization by maintenance engineering staff to change configuration controlled files based on specific CCR authorization.

9.8.8.6 Event and Error Messages

Standard DDTS event and error messages are used. There are no messages unique to the ECS implementation. A list of the PureDDTS event and error messages is not provided in the PureDDTS User's and Administrator's Manuals. However, messages provided during execution of DDTS are self explanatory.

9.8.9 Reports

Standard DDTS reports are to be used. Reference Chapter 3 of the DDTS User's Manual (Setting PureDDTS Options) for information concerning the printing of a CCR report and a description of the available report formats.

Table 9.8.9: Reports

Report Type	Report Description	When and Why Used
Not Applicable		

9.8.9.1 Sample Reports

9.8.9.1.1 Sample Report (Full Page Format)

Below is a sample CCR report resulting from the use of the DDTS Printing Option (full page format).

```
                    ECS_CHNG_REQ
                                        Page 1/3
CCR Number: MSSdd00630  Submitted   : 960529   Revision:
Priority  : routine     Change Class: II
Status    : Closed      Enclosures  : 3
Title:
 Revise Data Input Screen (Example Only)

CCR ORIGINATOR INFORMATION
  Originator Name: Frank Pace
  Organization   : LaRC
  Phone Number   : (999)234-1289
  Organization Evaluation Engineer: J. Bellamy

CONFIGURATION MANAGEMENT ADMINISTRATOR
  CM Admin. Name: bfloyd
  Organization  : LaRC
  Phone Number  : (999)234-1830
                    ECS_CHNG_REQ
                                        Page 2/3
CCR Number: MSSdd00630

ANALYSIS INFORMATION
  Evaluation Engineer : bfloyd
        Organization : LaRC
        Email Address: bfloyd@larc.com

  Impact Evaluators:
```

1. GSFC 2. LaRC 3. EDF 4. 5. 6.
7. 8. 9. 10. 11. 12.

Sites Affected:
1. GSFC 2. LaRC 3. SMC 4. 5. 6.
7. 8. 9.

Related CCR# :
CI Affected : Planning CSCI
Documents Affected:
Release Affected : Release X
Baselines Affected:

ECS_CHNG_REQ

CCR Number: MSSdd00630

DISPOSITION: Approved TESTING INFORMATION:
CCB Approval Official: John Wana Engr. Name: Joe Tester
Date: 960607 Organization: LaRC
CCB Organization: ESDIS Est. Testing Completion Date: 960614

IMPLEMENTATION VERIFICATION INFORMATION:
Organization: SEO Test Status (Pass/Fail): P
Engineer: bfloyd Enclosure Added (Y/N): N
E-mail: efinch@eos.com
Start Date: 960610
Est. Time to Complete: 2 days
Completion Date: 960612
Effective Date: 960710

CLOSING INFORMATION:
Closed by: Authur Closer Date: 960618 Org.: SMC

********** Proposed Change **********
Need or Problem: Describe the need or problem.

The need is -----

Proposed Solution: Describe the proposed solution.

Suggest that the following capability be changed as follows:
- capability changes

********** Impact Summary **********
Summarize the impact statements received from the organizations requested to provide impacts.

Summary of impacts received from GSFC and EDF is ---------

Resources Summarized: [description of resources]

Technical Summary:

ROM Summary (BOE, Cost & Schedule):

Recommendation: [Insert Recommendation]
********** Resolution **********

Describe how the request will be resolved/completed.

This request will be resolved as follows:
- Capability x will be modified to ----.

****

The Resolution Enclosure is the end of the full page format report.

9.8.9.1.2 Sample Report (Three Line Format)

Below is a sample CCR report resulting from the use of the DDTS Printing Option, Three Line Format. [Note: this document's margins forced the data to a fourth line.]

Submitted 960529, CCR# MSSdd00630, Originator Frank Pace
Title Revise Data Input Screen (Example Only)
Priority routine, Class II, CCB Org. ESDIS, Disp. Approved, Status Closed.

Submitted 960521, CCR# MSSdd00617, Originator Joseph Winkler
Title Add GUI to X11 Program (Example Only)
Priority routine, Class II, CCB Org. LaRC, Disp. Approved, Status Implemented.

9.8.9.1.3 Sample Report (Index Format)

Below is a sample CCR report resulting from the use of the DDTS Printing Option (Index format). Fields displayed are CCR Identifier, Title, Change Class, Priority, and Status.

MSSdd00630 Revise Data Input Screen(Example Only) II routine C
MSSdd00617 Add GUI to X11 Program (Example Only) II routine R

9.8.9.1.4 Sample Report (One Line Format)

Below is a sample CCR report resulting from the use of the DDTS Printing Option (One Line format). The operator selects the fields desired for the one line format. In this case, the Identifier, CCR Originator, Originator Organization, Implementing Organization, and Status fields were selected and their data values are displayed.

MSSdd00630 Frank Pace LaRC SEO C
MSSdd00617 Joseph Winkler GSFC LaRC R

9.8.9.2 Report Customization

Refer to Chapter 8 of the PureDDTS Administrator's Manual for explanations of how to customize DDTS reports. Chapter 8 explains how to customize canned reports and how to create and add new reports.

9.9 Use of the Baseline Manager

9.9.1 Purpose

Baseline Manager (BM) is used to record and report the as-built operational baseline of ECS products. It contains the configuration record for each baselined product. It identifies products by

CI name, description, location, model/version, and component configured articles. It provides traceability to previous configurations.

The spreadsheet in table 9.9-1 shows the myriad uses of Baseline Manager by a broad spectrum of ECS Operations personnel. The number sequences in the table have a connotation of access to a defined sequence of BM screens.

INSERT TABLE 9.9-1

9.9.2 Applicable to

All ECS Operations Personnel

9.9.3 References

ECS M&O CM Plan

9.9.4 Procedures

tbd

10. Metadata Administration

This section provides instructions for metadata administration activities for establishing collections (Section 10.1), installing Earth Science Data Types (ESDT) (Section 10.2), and maintaining the metadata (Section 10.3). These activities are performed by M&O personnel.

Table 10.1-1 provides an activity checklist for metadata administration. Column one (**Order**) shows the order in which tasks might be accomplished. Column two (**Role**) lists the Role/Manager/Operator responsible for performing the task. Column three (**Task**) provides a brief explanation of the task. Column four (**Section**) provides the Procedure (P) section number or Instruction (I) section number where details for performing the task can be found. Column five (**Complete?**) is used as a checklist to keep track of which task steps have been completed.

Table 10.1-1 Metadata Administration - Activity Checklist

Order	Role	Task	Section	Complete?
1	Data Specialist	Populate Collection-level Metadata	(I) 10.1.1	
2	Data Specialist	Populate Granule-level Metadata	(I) 10.1.2	
3	Data Specialist	Populate Product-specific Metadata	(I) 10.1.3	
4	Data Specialist	Specify ESDT Services	(I) 10.1.4	
5	Data Specialist	Assemble an ESDT Descriptor	(I) 10.2.1	
6	Data Specialist	Insert ESDT Descriptor and DLL	(I) 10.2.2	
7	Data Specialist	Update Metadata	(I) 10.3	

10.1 Establishing Collections

The smallest aggregation of data that is independently described and inventoried in ECS is referred to as a data granule. Each data granule consists of one or more physical files with an accompanying metadata record. Only one metadata record is allowed per granule, i.e., no sub-granule records are allowed and no files are shared between granules. In ECS, granules are organized into logical groupings called collections in which the granules vary principally by time or location. In Release A only collections in which the granules are homogeneous, which are called single-type collections, are permitted.

The ECS Science Data Model, described in 311-CD-002-004, contains metadata attributes which are necessary to identify, interpret, and perform services on granules and collections. These are called "core" attributes. The data model also provides for "product-specific" attributes, i.e., attributes which are unique to the data product.

The primary task in establishing a collection is providing the core and product-specific metadata attributes. This is done by creating an Earth Science Data Type (ESDT) descriptor file. The descriptor file is also used to specify the services that are available for the data. A Dynamic Link Library (DLL) contains code to implement those services. The descriptor file and the DLL are the means by which a collection is made known to the Science Data Server (SDSRV).

10.1.1 Population of Collection-level Metadata

A majority of the attributes in the ECS Data Model apply to all the granules in the collection. These are known as collection-level attributes. There can be both core and product-specific, collection-level attributes.

Collection-level metadata is input via the Collection-Level Metadata Population Tool. This HTML-forms GUI tool is based on DID 311 and is designed for use by instrument team scientists or other personnel having extensive knowledge of the data. It can import as defaults the attribute values from a collection that has already been populated. A sequence of screens is presented to the user enabling specification of all required and optional attributes, with a list of permitted values presented where appropriate and checking for valid formats performed.

When completed, the Collection-Level Metadata Population Tool creates output in Object Description Language (ODL), which can be directly inserted into an ESDT descriptor, as described in 10.2.1.

10.1.2 Population of Granule-level Metadata

The attributes in the ECS Data Model, which vary on a granule-by-granule basis, are known as granule-level attributes. There can be both core and product-specific granule-level attributes.

The mechanism for specifying granule-level metadata is the Metadata Configuration File (MCF). The MCF contains granule-level attributes with their values and reflects the way the searchable fields will be populated in the SDSRV database. The science software or Product Generation Executive (PGE), which generates the data product, interacts with the MCF using metadata tools contained in the Science Data Processing Toolkit. This completes values for metadata specified in the MCF, such as the temporal or spatial coverage of each granule, which will be inserted at PGE run time.

For each collection, an MCF template is supplied (Appendix J of the Toolkit Users Guide 333-CD-003-004). It is the responsibility of the instrument team or other data provider to edit the MCF template according to the instructions in Appendix J.

10.1.3 Population of Product-specific Metadata

Product-specific metadata can be at both the granule-level and the collection-level. Product-specific metadata may be contained in core metadata, in which case it will be searchable by ECS. There is also a provision to store product-specific metadata within granules that is entirely unknown to the rest of ECS. This is termed archive metadata and is specified in a separate ODL group in the MCF.

The core attribute that is available to store product-specific metadata is called ParameterValue. The metadata describing this attribute is contained in either the ECSParameter class or the AdditionalAttributes class. The units of measure, range, accuracy, and resolution for this is contained in the PhysicalParameterDetails class.

Product-specific metadata at the collection level is specified with the Collection-Level Metadata Population Tool. At the granule-level, product-specific metadata is defined in the MCF. In both cases, a list of valid values and permitted ranges is specified in the ESDT data dictionary.

10.1.4 Specifying ESDT Services

The services which apply to a collection are specified in the ESDT descriptor file. ECS-supplied services such as "insert" and "acquire" do not need to be specified in the DLL. Product-specific services, such as subsetting, require executable code to enact those services. This code is contained in the DLL. The DLL is written and tested by either the ECS developers or sustaining engineering personnel at the DAAC.

10.2 Installing ESDTs

10.2.1 Assembling an ESDT Descriptor

An ESDT descriptor file consists of four components, all in ODL: (1) Collection-Level Metadata; (2) Granule-Level Metadata; (3) A list of valid values and permitted ranges for all product-specific attributes; (4) A list of all services that apply to the data.

The ESDT descriptor file is assembled by concatenating the output from the Collection-Level metadata tool, the MCF; the ODL code specifying valid values and ranges; and, finally, a list of services. A template for ESDTs will be available from ECS. This will include a specification for all standard services.

10.2.2 Inserting the ESDT Descriptor and DLL

A DSS GUI is used to install a collection. The "data type" screen is brought up, resulting in a display of collections currently known to the SDSRV. To install a new collection the "Add" button at the bottom is selected. The operator then fills in fields for the Name and Version of the "data type" or collection, and then supplies the filenames for the descriptor and DLL. Clicking on "OK" causes the SDSRV to begin reading and checking the descriptor and DLL files.

Successful installation returns a message. If errors are detected in the files, the files will be rejected and not archived in the SDSRV. The engineer responsible for editing the collection level metadata will have to re-issue the descriptor file and try re-inserting the data type. In theory, this

should not happen if the Collection-Level metadata tool checks for valid metadata before the files are saved. (At present, the ESDT descriptor is the only place validity of metadata occurs. Ingest and SDPS call the same descriptor routine to archive validity checking.)

10.3 Maintaining Metadata

It is expected that collections will be modified and updated over time. In addition, some quality assurance will be performed after ESDTs have been installed and granules have been generated and stored in the archives. Thus there will be a need to update the metadata.

The metadata will be maintained using the same tools it is generated by. The MCF files will not be deleted in the SDSRV; the only way to maintain them is to re-issue them. To achieve an update, the Collection-level metadata population tool will be used to edit an existing record and generate a new version. This new granule will be inserted into the SDSRV as a new granule and will contribute to the historical record of the granule as held in the SDSRV.